



CALL NO. 100

CONTRACT ID. 131037

JEFFERSON COUNTY

FED/STATE PROJECT NUMBER TIP-STPE 0163(035)

DESCRIPTION PARKLANDS OF FLOYDS FORK (PRJ4A)

WORK TYPE GRADE & DRAIN WITH ASPHALT SURFACE

PRIMARY COMPLETION DATE (SEE SPECIAL NOTES)

LETTING DATE: June 7,2013

Sealed Bids will be received electronically through the Bid Express bidding service until 10:00 AM EASTERN DAYLIGHT TIME June 7,2013. Bids will be publicly announced at 10:00 AM EASTERN DAYLIGHT TIME.

PLANS AVAILABLE FOR THIS PROJECT.

DBE CERTIFICATION REQUIRED - 5%

REQUIRED BID PROPOSAL GUARANTY: Not less than 5% of the total bid.

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PART I
SCOPE OF WORK

ADMINISTRATIVE DISTRICT - 05

CONTRACT ID - 131037

TIP-STPE 0163(035)

COUNTY - JEFFERSON

PCN - DE056PARK1337

TIP-STPE 0163(035)

PARKLANDS OF FLOYDS FORK (PRJ4A) THE STRAND, TURKEY RUN PARK AND BROAD RUN PARK FROM THE TYLER SCHOOLING PROPERTY NEAR THE ENTRANCE OF DEER TRACE ESTATES OFF OF ROUTE ROAD IN THE NORTH TO BARDSTOWN ROAD IN THE SOUTH.GRADE & DRAIN WITH ASPHALT SURFACE
GEOGRAPHIC COORDINATES LATITUDE 38:22:16.00 LONGITUDE 85:47:40.00

COMPLETION DATE(S):

SEE SPECIAL NOTES

APPLIES TO ENTIRE CONTRACT

CONTRACT NOTES

PROPOSAL ADDENDA

All addenda to this proposal must be applied when calculating bid and certified in the bid packet submitted to the Kentucky Department of Highways. Failure to use the correct and most recent addenda may result in the bid being rejected.

BID SUBMITTAL

Bidder must use the Department's Expedite Bidding Program available on the Internet web site of the Department of Highways, Division of Construction Procurement. (www.transportation.ky.gov/contract)

The Bidder must download the bid file located on the Bid Express website (www.bidx.com) to prepare a bid packet for submission to the Department. The bidder must submit electronically using Bid Express.

JOINT VENTURE BIDDING

Joint venture bidding is permissible. All companies in the joint venture must be prequalified in one of the work types in the Qualifications for Bidders for the project. The bidders must get a vendor ID for the joint venture from the Division of Construction Procurement and register the joint venture as a bidder on the project. Also, the joint venture must obtain a digital ID from Bid Express to submit a bid. A joint bid bond of 5% may be submitted for both companies or each company may submit a separate bond of 5%.

UNDERGROUND FACILITY DAMAGE PROTECTION

The contractor is advised that the Underground Facility Damage Protection Act of 1994, became law January 1, 1995. It is the contractor's responsibility to determine the impact of the act regarding this project, and take all steps necessary to be in compliance with the provision of the act.

SPECIAL NOTE FOR PIPE INSPECTION

Contrary to Section 701.03.08 of the 2012 Standard Specifications for Road and Bridge Construction and Kentucky Method 64-114, certification by the Kentucky Transportation Center for prequalified Contractors to perform laser/video inspection is not required on this contract. It will continue to be a requirement for the Contractor performing any laser/video pipe inspection to be prequalified for this specialized item with the Kentucky Transportation Cabinet-Division of Construction Procurement.

REGISTRATION WITH THE SECRETARY OF STATE BY A FOREIGN ENTITY

Pursuant to KRS 176.085(1)(b), an agency, department, office, or political subdivision of the Commonwealth of Kentucky shall not award a state contract to a person that is a foreign entity required by [KRS 14A.9-010](#) to obtain a certificate of authority to transact business in the Commonwealth (“certificate”) from the Secretary of State under [KRS 14A.9-030](#) unless the person produces the certificate within fourteen (14) days of the bid or proposal opening. If the foreign entity is not required to obtain a certificate as provided in [KRS 14A.9-010](#), the foreign entity should identify the applicable exception. Foreign entity is defined within [KRS 14A.1-070](#).

For all foreign entities required to obtain a certificate of authority to transact business in the Commonwealth, if a copy of the certificate is not received by the contracting agency within the time frame identified above, the foreign entity’s solicitation response shall be deemed non-responsive or the awarded contract shall be cancelled.

Businesses can register with the Secretary of State at <https://secure.kentucky.gov/sos/ftbr/welcome.aspx>.

SPECIAL NOTE FOR PROJECT QUESTIONS DURING ADVERTISEMENT

Questions about projects during the advertisement should be submitted in writing to the Division of Construction Procurement. This may be done by fax (502) 564-7299 or email to kytc.projectquestions@ky.gov. The Department will attempt to answer all submitted questions. The Department reserves the right not to answer if the question is not pertinent or does not aid in clarifying the project intent.

The deadline for posting answers will be 3:00 pm Eastern Daylight Time, the day preceding the Letting. Questions may be submitted until this deadline with the understanding that the later a question is submitted, the less likely an answer will be able to be provided.

The questions and answers will be posted for each Letting under the heading “Questions & Answers” on the Construction Procurement website (www.transportation.ky.gov/contract). The answers provided shall be considered part of this Special Note and, in case of a discrepancy, will govern over all other bidding documents.

HARDWOOD REMOVAL RESTRICTIONS

The Kentucky Division of Forestry has imposed a quarantine in Anderson, Boone, Bourbon, Boyd, Boyle, Bracken, Campbell, Carroll, Fayette, Franklin, Gallatin, Garrard,

Grant, Greenup, Hardin, Harrison, Henry, Jefferson, Jessamine, Kenton, Oldham, Owen, Pendleton, Scott, Shelby, Trimble, and Woodford Counties to prevent the spread of an invasive insect, the emerald ash borer. Hardwood cut in conjunction with the project may not be removed from the county of its origin. Chipping or burning on site is the preferred method of disposal.

INSTRUCTIONS FOR EXCESS MATERIAL SITES AND BORROW SITES

Identification of excess material sites and borrow sites shall be the responsibility of the Contractor. The Contractor shall be responsible for compliance with all applicable state and federal laws and may wish to consult with the US Fish and Wildlife Service to seek protection under Section 10 of the Endangered Species Act for these activities.

ACCESS TO RECORDS

The contractor, as defined in KRS 45A.030 (9) agrees that the contracting agency, the Finance and Administration Cabinet, the Auditor of Public Accounts, and the Legislative Research Commission, or their duly authorized representatives, shall have access to any books, documents, papers, records, or other evidence, which are directly pertinent to this contract for the purpose of financial audit or program review. Records and other prequalification information confidentially disclosed as part of the bid process shall not be deemed as directly pertinent to the contract and shall be exempt from disclosure as provided in KRS 61.878(1)(c). The contractor also recognizes that any books, documents, papers, records, or other evidence, received during a financial audit or program review shall be subject to the Kentucky Open Records Act, KRS 61.870 to 61.884.

In the event of a dispute between the contractor and the contracting agency, Attorney General, or the Auditor of Public Accounts over documents that are eligible for production and review, the Finance and Administration Cabinet shall review the dispute and issue a determination, in accordance with Secretary's Order 11-004. (See attachment)

09/26/2012

FEDERAL CONTRACT NOTES

The Kentucky Department of Highways, in accordance with the Regulations of the United States Department of Transportation 23 CFR 635.112 (h), hereby notifies all bidders that failure by a bidder to comply with all applicable sections of the current Kentucky Standard Specifications, including, but not limited to the following, may result in a bid not being considered responsive and thus not eligible to be considered for award:

102.02 Current Capacity Rating 102.10 Delivery of Proposals
102.08 Irregular Proposals 102.14 Disqualification of Bidders
102.09 Proposal Guaranty

CIVIL RIGHTS ACT OF 1964

The Kentucky Department of Highways, in accordance with the provisions of Title VI of the Civil Rights Act of 1964 (78 Stat. 252) and the Regulations of the Federal Department of Transportation (49 C.F.R., Part 21), issued pursuant to such Act, hereby notifies all bidders that it will affirmatively insure that the contract entered into pursuant to this advertisement will be awarded to the lowest responsible bidder without discrimination on the ground of race, color, or national origin.

NOTICE TO ALL BIDDERS

To report bid rigging activities call: 1-800-424-9071.

The U.S. Department of Transportation (DOT) operates the above toll-free "hotline" Monday through Friday, 8:00 a.m. to 5:00 p.m. eastern time. Anyone with knowledge of possible bid rigging, bidder collusion, or other fraudulent activities should use the "hotline" to report such activities.

The "hotline" is part of the DOT's continuing effort to identify and investigate highway construction contract fraud and abuse and is operated under the direction of the DOT Inspector General. All information will be treated confidentially and caller anonymity will be respected.

SECOND TIER SUBCONTRACTS

Second Tier subcontracts on federally assisted projects shall be permitted. However, in the case of DBE's, second tier subcontracts will only be permitted where the other subcontractor is also a DBE. All second tier subcontracts shall have the consent of both the Contractor and the Engineer.

DISADVANTAGED BUSINESS ENTERPRISE PROGRAM

It is the policy of the Kentucky Transportation Cabinet (“the Cabinet”) that Disadvantaged Business Enterprises (“DBE”) shall have the opportunity to participate in the performance of highway construction projects financed in whole or in part by Federal Funds in order to create a level playing field for all businesses who wish to contract with the Cabinet. To that end, the Cabinet will comply with the regulations found in 49 CFR Part 26, and the definitions and requirements contained therein shall be adopted as if set out verbatim herein.

The Cabinet, contractors, subcontractors, and sub-recipients shall not discriminate on the basis of race, color, national origin, or sex in the performance of work performed pursuant to Cabinet contracts. The contractor shall carry out applicable requirements of 49 CFR 26 in the award and administration of federally assisted highway construction projects. The contractor will include this provision in all its subcontracts and supply agreements pertaining to contracts with the Cabinet.

Failure by the contractor to carry out these requirements is a material breach of its contract with the Cabinet, which may result in the termination of the contract or such other remedy as the Cabinet deems necessary.

DBE GOAL

The Disadvantaged Business Enterprise (DBE) goal established for this contract, as listed on the front page of the proposal, is the percentage of the total value of the contract.

The contractor shall exercise all necessary and reasonable steps to ensure that Disadvantaged Business Enterprises participate in a least the percent of the contract as set forth above as goals for this contract.

OBLIGATION OF CONTRACTORS

Each contractor prequalified to perform work on Cabinet projects shall designate and make known to the Cabinet a liaison officer who is assigned the responsibility of effectively administering and promoting an active program for utilization of DBEs.

If a formal goal has not been designated for the contract, all contractors are encouraged to consider DBEs for subcontract work as well as for the supply of material and services needed to perform this work.

Contractors are encouraged to use the services of banks owned and controlled by minorities and women.

CERTIFICATION OF CONTRACT GOAL

Contractors shall include the following certification in bids for projects for which a DBE goal has been established. BIDS SUBMITTED WHICH DO NOT INCLUDE CERTIFICATION OF DBE PARTICIPATION WILL NOT BE ACCEPTED. These bids will not be considered for award by the Cabinet and they will be returned to the bidder.

“The bidder certifies that it has secured participation by Disadvantaged Business Enterprises (“DBE”) in the amount of ____ percent of the total value of this contract and that the DBE participation is in compliance with the requirements of 49 CFR 26 and the policies of the Kentucky Transportation Cabinet pertaining to the DBE Program.”

The certification statement is located in the electronic bid file. All contractors must certify their DBE participation on that page. DBEs utilized in achieving the DBE goal must be certified and prequalified for the work items at the time the bid is submitted.

DBE PARTICIPATION PLAN

Lowest responsive bidders must submit the *DBE Plan/ Subcontractor Request*, form TC 63-35 DBE, within 10 days of the letting. This is necessary before the Awards Committee will review and make a recommendation. **The project will not be considered for award prior to submission and approval of the apparent low bidder’s DBE Plan/Subcontractor Request.**

The DBE Participation Plan shall include the following:

- 1 Name and address of DBE Subcontractor(s) and/or supplier(s) intended to be used in the proposed project;
- 2 Description of the work each is to perform including the work item , unit, quantity, unit price and total amount of the work to be performed by the individual DBE. The Project Code Number (PCN), Category Number, and the Project Line Number can be found in the “material listing” on the Construction Procurement website under the specific letting;
- 3 The dollar value of each proposed DBE subcontract and the percentage of total project contract value this represents. DBE participation may be counted as follows; a) If DBE suppliers and manufactures assume actual and contractual responsibility, the dollar value of materials to be furnished will be counted toward the goal as follows:
 - The entire expenditure paid to a DBE manufacturer;
 - 60 percent of expenditures to DBE suppliers that are not manufacturers provided the supplier is a regular dealer in the product involved. A regular dealer must be engaged in, as its principal business and in its own name, the sale of products to

- the public, maintain an inventory and own and operate distribution equipment;
and
- The amount of fees or commissions charged by the DBE firms for a bona fide service, such as professional, technical, consultant, or managerial services and assistance in the procurement of essential personnel, facilities, equipment, materials, supplies, delivery of materials and supplies or for furnishing bonds, or insurance, providing such fees or commissions are determined to be reasonable and customary.
- b) The dollar value of services provided by DBEs such as quality control testing, equipment repair and maintenance, engineering, staking, etc.;
- c) The dollar value of joint ventures. DBE credit for joint ventures will be limited to the dollar amount of the work actually performed by the DBE in the joint venture;
- 4 Written and signed documentation of the bidder's commitment to use a DBE contractor whose participation is being utilized to meet the DBE goal; and
- 5 Written and signed confirmation from the DBE that it is participating in the contract as provided in the prime contractor's commitment.

UPON AWARD AND BEFORE A WORK ORDER WILL BE ISSUED

Contractors must submit the signed subcontract between the contractor and the DBE contractor, the DBE's certificate of insurance, and an affidavit for bidders, offerors, and contractors from the DBE to the Division of Construction Procurement. The affidavit can be found on the Construction Procurement website. If the DBE is a supplier of materials for the project, a signed purchase order and an affidavit for bidders, offerors, and contractors must be submitted to the Division of Construction Procurement.

Changes to DBE Participation Plans must be approved by the Cabinet. The Cabinet may consider extenuating circumstances including, but not limited to, changes in the nature or scope of the project, the inability or unwillingness of a DBE to perform the work in accordance with the bid, and/or other circumstances beyond the control of the prime contractor.

CONSIDERATION OF GOOD FAITH EFFORTS REQUESTS

If the DBE participation submitted in the bid by the apparent lowest responsive bidder does not meet or exceed the DBE contract goal, the apparent lowest responsive bidder must submit a Good Faith Effort Package to satisfy the Cabinet that sufficient good faith efforts were made to meet the contract goals prior to submission of the bid. Efforts to increase the goal after bid submission will not be considered in justifying the good faith effort, unless the contractor can show that the proposed DBE was solicited prior to the letting date. DBEs utilized in achieving the DBE goal must be certified and prequalified for the work items at the time the bid is submitted. One complete set and nine (9) copies of this information must be received in the

office of the Division of Contract Procurement no later than 12:00 noon of the tenth calendar day after receipt of notification that they are the apparent low bidder.

Where the information submitted includes repetitious solicitation letters it will be acceptable to submit a sample representative letter along with a distribution list of the firms solicited. Documentation of DBE quotations shall be a part of the good faith effort submittal as necessary to demonstrate compliance with the factors listed below which the Cabinet considers in judging good faith efforts. This documentation may include written subcontractors' quotations, telephone log notations of verbal quotations, or other types of quotation documentation.

The Good Faith Effort Package shall include, but may not be limited to information showing evidence of the following:

- 1 Whether the bidder attended any pre-bid meetings that were scheduled by the Cabinet to inform DBEs of subcontracting opportunities;
- 2 Whether the bidder provided solicitations through all reasonable and available means;
- 3 Whether the bidder provided written notice to all DBEs listed in the DBE directory at the time of the letting who are prequalified in the areas of work that the bidder will be subcontracting;
- 4 Whether the bidder followed up initial solicitations of interest by contacting DBEs to determine with certainty whether they were interested. If a reasonable amount of DBEs within the targeted districts do not provide an intent to quote or no DBEs are prequalified in the subcontracted areas, the bidder must notify the DBE Liaison in the Office of Minority Affairs to give notification of the bidder's inability to get DBE quotes;
- 5 Whether the bidder selected portions of the work to be performed by DBEs in order to increase the likelihood of meeting the contract goals. This includes, where appropriate, breaking out contract work items into economically feasible units to facilitate DBE participation, even when the prime contractor might otherwise perform these work items with its own forces;
- 6 Whether the bidder provided interested DBEs with adequate and timely information about the plans, specifications, and requirements of the contract;
- 7 Whether the bidder negotiated in good faith with interested DBEs not rejecting them as unqualified without sound reasons based on a thorough investigation of their capabilities. Any rejection should be so noted in writing with a description as to why an agreement could not be reached;
- 8 Whether quotations were received from interested DBE firms but were rejected as unacceptable without sound reasons why the quotations were considered unacceptable. The fact that the DBE firm's quotation for the work is not the lowest quotation received will not in itself be considered as a sound reason for rejecting the quotation as unacceptable. The fact that the bidder has the ability and/or desire to perform the contract work with its own forces will not be considered a sound reason for rejecting a DBE quote. Nothing in this provision shall be construed to require the bidder to accept unreasonable quotes in order to satisfy DBE goals;
- 9 Whether the bidder specifically negotiated with subcontractors to assume part of the responsibility to meet the contract DBE goal when the work to be subcontracted includes potential DBE participation;
- 10 Whether the bidder made any efforts and/or offered assistance to interested DBEs in obtaining the necessary equipment, supplies, materials, insurance and/or bonding to satisfy the

work requirements of the bid proposal; and

11 Any other evidence that the bidder submits which may show that the bidder has made reasonable good faith efforts to include DBE participation.

FAILURE TO MEET GOOD FAITH REQUIREMENT

Where the apparent lowest responsive bidder fails to submit sufficient participation by DBE firms to meet the contract goal and upon a determination by the Good Faith Committee based upon the information submitted that the apparent lowest responsive bidder failed to make sufficient reasonable efforts to meet the contract goal, the bidder will be offered the opportunity to meet in person for administrative reconsideration. The bidder will be notified of the Committee's decision within 24 hours of its decision. The bidder will have 24 hours to request reconsideration of the Committee's decision. The reconsideration meeting will be held within two days of the receipt of a request by the bidder for reconsideration.

The request for reconsideration will be heard by the Office of the Secretary. The bidder will have the opportunity to present written documentation or argument concerning the issue of whether it met the goal or made an adequate good faith effort. The bidder will receive a written decision on the reconsideration explaining the basis for the finding that the bidder did or did not meet the goal or made adequate Good Faith efforts to do so.

The result of the reconsideration process is not administratively appealable to the Cabinet or to the United States Department of Transportation.

The Cabinet reserves the right to award the contract to the next lowest responsive bidder or to rebid the contract in the event that the contract is not awarded to the low bidder as the result of a failure to meet the good faith requirement.

SANCTIONS FOR FAILURE TO MEET DBE REQUIREMENTS OF THE PROJECT

Failure by the prime contractor to fulfill the DBE requirements of a project under contract or to demonstrate good faith efforts to meet the goal constitutes a breach of contract. When this occurs, the Cabinet will hold the prime contractor accountable, as would be the case with all other contract provisions. Therefore, the contractor's failure to carry out the DBE contract requirements shall constitute a breach of contract and as such the Cabinet reserves the right to exercise all administrative remedies at its disposal including, but not limited to the following:

- Disallow credit toward the DBE goal;
- Withholding progress payments;
- Withholding payment to the prime in an amount equal to the unmet portion of the contract goal; and/or
- Termination of the contract.

PROMPT PAYMENT

The prime contractor will be required to pay the DBE within seven (7) working days after he or she has received payment from the Kentucky Transportation Cabinet for work performed or materials furnished.

CONTRACTOR REPORTING

All contractors must keep detailed records and provide reports to the Cabinet on their progress in meeting the DBE requirement on any highway contract. These records may include, but shall not be limited to payroll, lease agreements, cancelled payroll checks, executed subcontracting agreements, etc. Prime contractors will be required to submit certified reports on monies paid to each DBE subcontractor or supplier utilized to meet a DBE goal.

Payment information that needs to be reported includes date the payment is sent to the DBE, check number, Contract ID, amount of payment and the check date. Before Final Payment is made on this contract, the Prime Contractor will certify that all payments were made to the DBE subcontractor and/or DBE suppliers.

The Prime Contractor should supply the payment information at the time the DBE is compensated for their work. Form to use is located at:

<http://transportation.ky.gov/Construction/Pages/Subcontracts.aspx>

Photocopied payments and completed form to be submitted to: Office of Civil Rights and Small Business Development 6th Floor West 200 Mero Street Frankfort, KY 40622

DEFAULT OR DECERTIFICATION OF THE DBE

If the DBE subcontractor or supplier is decertified or defaults in the performance of its work, and the overall goal cannot be credited for the uncompleted work, the prime contractor may utilize a substitute DBE or elect to fulfill the DBE goal with another DBE on a different work item. If after exerting good faith effort in accordance with the Cabinet's Good Faith Effort policies and procedures, the prime contractor is unable to replace the DBE, then the unmet portion of the goal may be waived at the discretion of the Cabinet.

09/14/11

**PROJECT MANUAL AND FRONT END SPECIFICATIONS
FOR
THE PARKLANDS OF FLOYDS FORK – PROJECT 4A
THE STRAND, TURKEY RUN PARK & BROAD RUN PARK**



May 8, 2013

OWNER

21ST CENTURY PARKS, INC.
471 WEST MAIN STREET
SUITE 202
LOUISVILLE, KY 40202

CONSULTANT / LANDSCAPE ARCHITECT

WALLACE ROBERTS & TODD, LLC
1700 MARKET STREET, 28TH FLOOR
PHILADELPHIA, PA 19103
TEL 215-732-5215
FAX 215-732-2551

SUBCONSULTANTS

ARCHITECT

BRAVURA CORPORATION
111 WEST WASHINGTON STREET
LOUISVILLE, KY 40202
TEL 502-584-9900
FAX 502-584-0829

CATENARY BRIDGE ENGINEER

OPAC CONSULTING ENGINEERS, INC.
315 BAY STREET, 2ND FLOOR
SAN FRANCISCO, CA 94113
TEL 415-989-4551
FAX 415-989-4135

ELECTRICAL ENGINEER

CMTA ENGINEERING CONSULTANTS
10411 MEETING STREET
LOUISVILLE, KY 40253-0594
TEL 502-326-3085
FAX 502-326-2691

ARCHITECTURAL STRUCTURAL ENGINEER

SLESSER ENGINEERING, INC.
2325 LIME KILN LANE
LOUISVILLE, KY 40222
TEL 502-425-0187
FAX 502-425-0620

SITE CIVIL & STRUCTURAL ENGINEER

Qk4
815 WEST MARKET STREET, SUITE 300
LOUISVILLE, KY 40202
TEL 502-585-2222
FAX 502-581-0406

ECOLOGICAL SPECIALIST

REDWING ECOLOGICAL SERVICES, INC.
1139 SOUTH FOURTH STREET
LOUISVILLE, KY 40203
TEL 502-625-3009
FAX 502-625-3077

GEOTECHNICAL ENGINEER

AMEC Environment & Infrastructure, Inc.
690 COMMONWEALTH CENTER, 11003 BLUEGRASS PARKWAY
LOUISVILLE, KY 40299
TEL 502-267-0700
FAX 502-267-5900

**THE PARKLANDS OF FLOYDS FORK – PROJECT 4A
THE STRAND, TURKEY RUN PARK & BROAD RUN PARK**

SECTION 00001

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THE STRAND, TURKEY RUN PARK & BROAD RUN PARK**

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SECTION 00002

PROJECT DESCRIPTION

This project is the development of the portion of work receiving partial funding through the Federal Highway Administration (FHWA) for The Strand, Turkey Run Park and Broad Run Park from the Tyler Schooling Property near the Deer Trace Estates off of Route Road in the north to Bardstown Road in the south. It is the sixth facility to be constructed as part of a much larger park being implemented in phases. This portion of the park encompasses approximately 1,000 ha (2,500 acres) of land and includes a Park Road; a multi-use trail known as the Louisville Loop; four bridges across Floyds Fork Creek; one bridge over Broad Run Creek, a catenary bridge over Turkey Run Creek, bioengineering and abutment protection for each bridge; retaining walls; parking lots; wooden boardwalk; trailheads; site electrical, and signature and excursion trails.

Components of the site design include: demolition; general grading; dry laid stone headwalls and endwalls; asphalt paving; culverts; con-spans, retaining walls; concrete paving; seeding; site electrical; guardrails; gates; site furniture foundations; fences and bollards.

Components of the bridges include: cast-in-place concrete for slab, barriers, diaphragms, abutment, end bent, wingwalls, approach slab, and 6" sloped wall, plain and epoxy coated reinforcement, stainless steel railing, haunched weathering steel plate girders, steel h-piles, variegated stone blocks for landscaping and erosion control, roughback and smooth finish variegated stone blocks for abutment facing, structure granular backfill, and gabion walls.

Components of the catenary bridge include: PT strand rock anchors with multiple-stage grouting, reinforced concrete cable anchorages, galvanized structural strand cables with open spelter sockets, built-up steel plate cable saddles, built-up steel plate cable bents (armatures), rolled structural steel miscellaneous channels and wide flanges, ipe (lapacho subspecies) hardwood decking, 3x1/16 elastomeric pad damping strips, Esco twitch slide handrail cable chokers, wire rope hangers with ferrules each end, and annealed or painted 9-gage, 2" x 2" cyclone mesh.

Components of the bioengineering around the bridges include: boulder toe, branch layering, live staking, joint plantings (rip rap and soil mixture), variegated limestone rock, erosion control matting, native seed, and native tree and shrub plantings.

Components of the trailhead include: cast in place board-formed concrete; pre-cast concrete; glulam columns and beams; wood siding; general carpentry; windows; metal roofing; site furnishing foundations, plumbing and lighting.

Coordination with 4B:

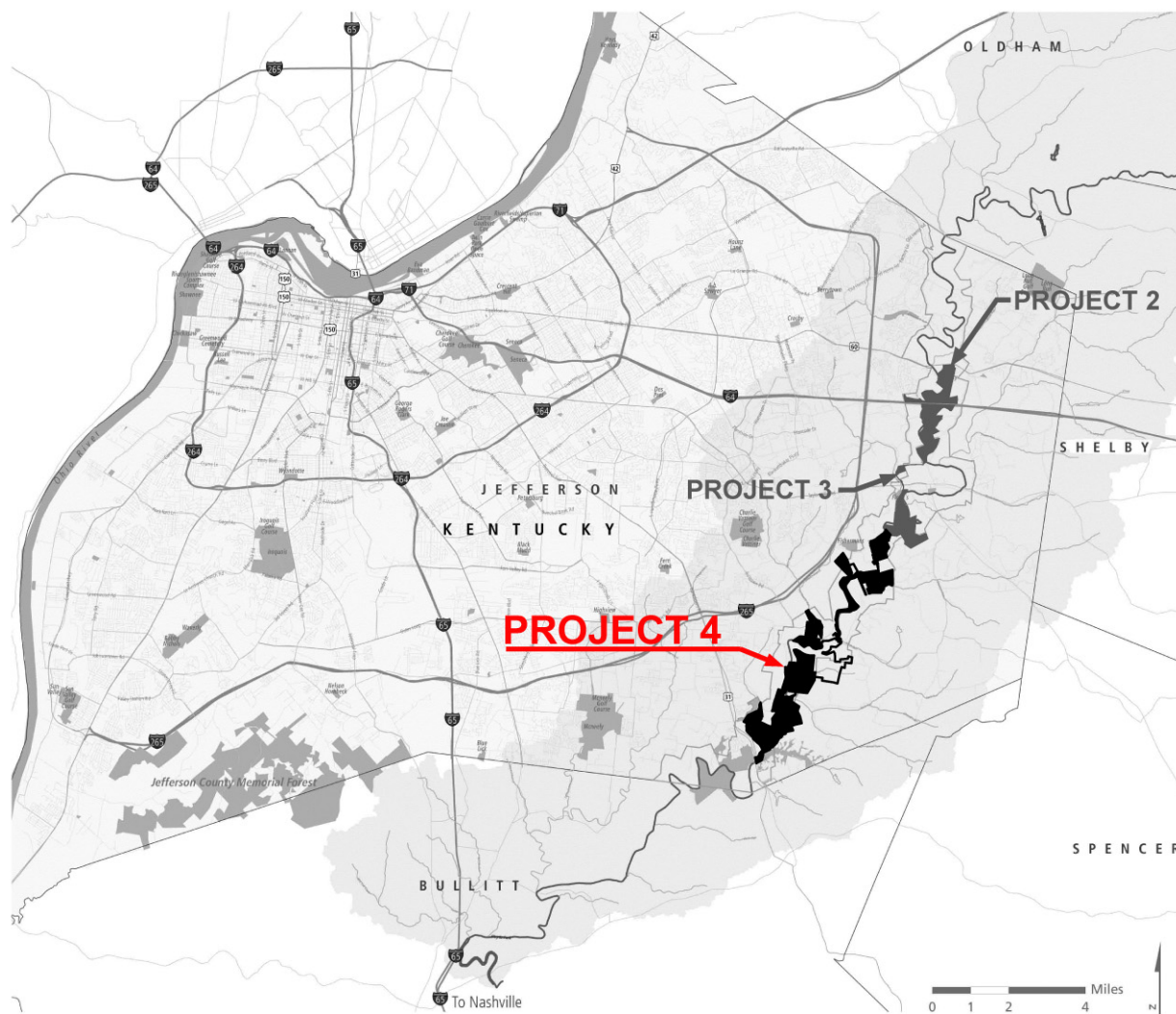
**THE PARKLANDS OF FLOYDS FORK – PROJECT 4A
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The contractor for the 4A project will have to coordinate their work with the 4B general contractor that will be selected after the 4A contractor is under contract. Project 4B is the development of the private pay portion of work for the The Strand, Turkey Run Park & Broad Run Park. The work may include the development of the Silo Center, Cliffside Center, hike/bike trails and plantings.

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SECTION 00003

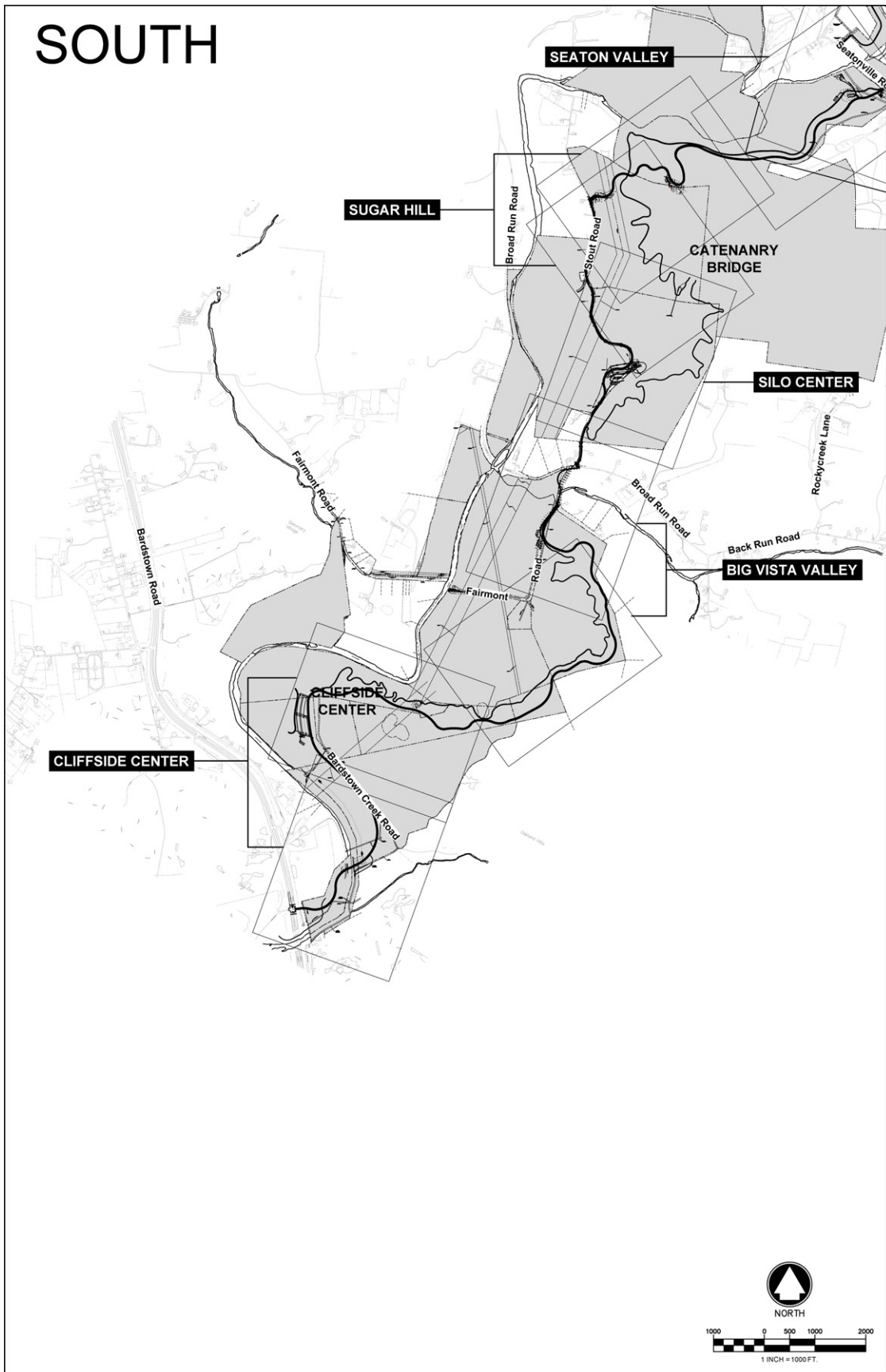
SITE MAPS



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THE PARKLANDS OF FLOYDS FORK – PROJECT 4A THE STRAND, TURKEY RUN PARK & BROAD RUN PARK



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SECTION 00100

INVITATION AND INSTRUCTION TO BIDDERS

- 1.0 Invitation: 21st Century Parks, Inc. and Kentucky Transportation Cabinet (KYTC) are now accepting bids for **The Parklands of Floyds Fork – Project 4A: The Strand, Turkey Run Park & Broad Run Park**. The process of accepting bids and choosing the successful bidder shall be by Competitive Sealed Bidding (CSB). Sealed bids will be received by the Kentucky Transportation Cabinet until **10:00 AM EST on June 7, 2013**. Bidder must use the Department's Expedite Bidding Program available on the Internet web site of the Department of Highways, Division of Construction Procurement. (www.transportation.ky.gov/construction-procurement). The Bidder must download the bid file located on the Bid Express website (www.bidx.com) to prepare a bid packet for submission to the Department. The bidder must submit electronically using Bid Express.

Bids will not be accepted after the 10:00AM, EDT deadline on June 7, 2013.

A **Mandatory Pre-Bid Conference** has been scheduled for **1:00 PM on May 16, 2013**. All bidders **must attend** this conference. All Bidders will be required to sign-in at the meeting to confirm their attendance. The meeting will be held at the offices of KYTC, District 5, 8310 Westport Road, Louisville, KY 40242. Following the Pre-Bid Conference, the project site will be made available and Bidders will have an opportunity to tour the site.

Bidder Questions and Inquiries: Bidders having questions and inquiries on the specifications of this Competitive Sealed Bids shall be directed to:

Ryan Griffith, P.E.
Acting Director
Division of Construction Procurement
Kentucky Transportation Cabinet
200 Mero Street
Frankfort, KY 40622
(502) 564-3500 ext. 3758
ryan.griffith@ky.gov

Any information provided is not official unless reduced to writing by 21st Century Parks and presented by KYTC. Any unauthorized contact with any employee of 21st Century Parks or the KYTC in connection with this CSB is prohibited and shall be cause for disqualification of the Bidder. No questions or inquiries will be allowed beyond 5:00 p.m. EST, May 30, 2013.

Careful attention must be paid to all requested items contained in this CSB. Bidders are invited to submit bids in accordance with the requirements of this CSB.

Please read the entire package before bidding. Bidders shall make the necessary entry in all blanks provided for the responses. The submitted bid shall be firm for an acceptance period of sixty (60) days from the date of the bid opening.

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Submitted bid shall be for a firm, fixed price, Stipulated Sum.

By submitting a Bid, the bidder acknowledges and agrees to be bound by the terms and conditions of the solicitation. This Competitive Sealed Bid document including all terms, conditions and specifications contained herein shall become the contract if 21st Century Parks awards the Bid to the bidder hereunder. The bidder agrees that a resulting contract is the complete and exclusive statement of the agreement between the parties, which supersedes all prior agreements, oral or written, and all other communications between the parties relating to the subject matter of this solicitation. It is further agreed between the parties, that any change of the contractual agreement must be formalized by issuance of a written modification from 21st Century Parks. The only terms and conditions acceptable to 21st Century Parks are as outlined in this CSB. Bids containing additional and/or inconsistent terms and conditions will be considered non-responsive and shall be rejected. Purchase or sales agreements, supplied by the bidder, making an offer in reply to this solicitation will not be accepted.

In the event a conflict exists between sections of this CSB, such conflict shall be brought to the attention of 21st Century Parks in writing for resolution.

Unless contractually provided, 21st Century Parks will not be required to enter into nor sign further agreements, leases, company orders or other documents to complete or initiate the terms of a delivery order resulting from these contracts. Any such documents so obtained will not be binding on 21st Century Parks or its agents and shall be cause for termination of the contract by 21st Century Parks.

Prices for any bid item shall not be contingent upon the purchase of any other bid item included within this bid.

- 1.1 Bid Opening: Sealed bids will be accepted in accordance with the instructions detailed in Section 1.0.

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SECTION 00200

GENERAL PROVISIONS

- 2.1 Each Bidder shall comply with all Federal, State & Local regulations concerning this type of service or good.

The Bidder agrees to comply with all statutes, rules, and regulations governing safe and healthful working conditions, including the Occupational Health and Safety Act of 1970, *29 U.S.C. 650 et seq.*, as amended, and KRS Chapter 338. The Bidder also agrees to notify 21st Century Parks in writing immediately upon detection of any unsafe and/or unhealthful working conditions at the job site. Bidder agrees to indemnify, defend and hold 21st Century Parks harmless from all penalties, fines or other expenses arising out of the alleged violation of said laws.

- 2.2 Failure to submit ALL forms and information required in this CSB may be grounds for disqualification.

- 2.3 Addenda: All addenda, if any, shall be considered in making the bid, and such addenda shall be made a part of this CSB. Before submitting a bid, it is incumbent upon each Bidder to be informed as to whether any addenda have been issued, and the failure to cover in the bid any such addenda may result in disqualification of that bid.

- 2.4 Bid Reservations: 21st Century Parks reserves the right to reject any or all bids, to award in whole or part, and to waive minor immaterial defects in bids. 21st Century Parks may consider any alternative bid that meets its basic needs.

- 2.5 Liability: 21st Century Parks is not responsible for any cost incurred by a Bidder in the preparation of bids.

- 2.6 Changes/Alterations: Bidder may change or withdraw a bid at any time prior to bid opening; however, no oral modifications will be allowed. Only telegrams, letters, or other formal written requests for modifications or corrections of a previously submitted bid which is addressed in the same manner as the bid, and received by 21st Century Parks prior to the scheduled closing time for receipt of bids, will be accepted. The bid, when opened, will then be corrected in accordance with such written request(s), provided that the written request is contained in a sealed envelope which is plainly marked "modifications of bid".

- 2.7 Clarification of Submittal: 21st Century Parks reserves the right to obtain clarification of any point in a bid or to obtain additional information from a Bidder.

- 2.8 Bribery Clause: By his/her signature on the bid, Bidder certifies that no employee of his/hers, any affiliate or Subcontractor, has bribed or attempted to bribe an officer or employee of 21st Century Parks.

- 2.9 Additional Information: While not necessary, the Bidder may include any product brochures, software documentation, sample reports, or other documentation that may assist 21st Century Parks

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in better understanding and evaluating the Bidder's bid. Additional documentation shall not serve as a substitute for other documentation which is required by this CSB to be submitted with the bid.

- 2.15 Ambiguity, Conflict or other Errors in CSB: If a Bidder discovers any ambiguity, conflict, discrepancy, omission or other error in the CSB, they shall immediately notify 21st Century Parks of such error in writing and request modification or clarification of the document.
- 2.16 Agreement to Bid Terms: In submitting this bid, the Bidder agrees that Bidder has carefully examined the specifications and all provisions relating to the work to be done attached hereto and made part of this bid. By acceptance of a Contract under this Competitive Sealed Bid, Bidder states that it understands the meaning, intent and requirements of the Competitive Sealed Bids and agrees to the same. The successful Bidder shall warrant that it is familiar with and understands all provisions herein and shall warrant that it can comply with them. No additional compensation to Bidder shall be authorized for services or expenses reasonably covered under these provisions that the Bidder omits from its Bid.
- 2.17 Cancellation: If the services to be performed hereunder by the Bidder are not performed in an acceptable manner to 21st Century Parks, they may cancel this contract for cause by providing written notice to the Bidder, giving at least thirty (30) days notice of the proposed cancellation and the reasons for same. During that time period, the Bidder may seek to bring the performance of services hereunder to a level that is acceptable to 21st Century Parks, and 21st Century Parks may rescind the cancellation if such action is in their best interest.

A. Termination for Cause

- (1) 21st Century Parks may terminate a contract because of the contractor's failure to perform its contractual duties.
- (2) If a contractor is determined to be in default, 21st Century Parks shall notify the contractor of the determination in writing, and may include a specified date by which the contractor shall cure the identified deficiencies. 21st Century Parks may proceed with termination if the contractor fails to cure the deficiencies within the specified time.
- (3) A default in performance by a contractor for which a contract may be terminated shall include, but shall not necessarily be limited to:
 - (a) Failure to perform the contract according to its terms, conditions and specifications;
 - (b) Failure to make delivery within the time specified or according to a delivery schedule fixed by the contract;
 - (c) Late payment or nonpayment of bills for labor, materials, supplies, or equipment furnished in connection with a contract for construction services as evidenced by mechanics' liens filed pursuant to the provisions of KRS Chapter 376, or letters of indebtedness received from creditors by the purchasing agency;
 - (d) Failure to diligently advance the work under a contract for construction services;
 - (e) The filing of a bankruptcy petition by or against the contractor; or

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- (f) Actions that endanger the health, safety or welfare of 21st Century Parks or its employees.

B. At Will Termination

Notwithstanding the above provisions, 21st Century Parks may terminate this contract at will in accordance with the law upon providing thirty (30) days written notice of that intent. Payment for services or goods received prior to termination shall be made by 21st Century Parks provided those goods or services were provided in a manner acceptable to 21st Century Parks. Payment for those goods and services shall not be unreasonably withheld.

- 2.18 **Assignment of Contract:** The Bidder shall not assign or subcontract any portion of the Contract without the express written consent of 21st Century Parks. Any purported assignment or subcontract in violation hereof shall be void. It is expressly acknowledged that 21st Century Parks shall never be required or obligated to consent to any request for assignment or subcontract; and further that such refusal to consent can be for any or no reason, fully within the sole discretion of 21st Century Parks.
- 2.19 **No Waiver:** No failure or delay by 21st Century Parks in exercising any right, remedy, power or privilege hereunder, nor any single or partial exercise thereof, nor the exercise of any other right, remedy, power or privilege shall operate as a waiver hereof or thereof. No failure or delay by 21st Century Parks in exercising any right, remedy, power or privilege under or in respect of this Contract shall affect the rights, remedies, powers or privileges of 21st Century Parks hereunder or shall operate as a waiver thereof.
- 2.20 **Authority to do Business:** The Bidder must be a duly organized and authorized to do business under the laws of Kentucky. Bidder must be in good standing and have full legal capacity to provide the services specified under this Contract. The Bidder must have all necessary right and lawful authority to enter into this Contract for the full term hereof and that proper corporate or other action has been duly taken authorizing the Bidder to enter into this Contract. The Bidder will provide 21st Century Parks with a copy of a corporate resolution authorizing this action and a letter from an attorney confirming that the Bidder is authorized to do business in the State of Kentucky if requested. All bids must be signed by a duly authorized officer, agent or employee of the Bidder.
- 2.21 **Governing Law:** This Contract shall be governed by and construed in accordance with the laws of the State of Kentucky. In the event of any proceedings regarding this Agreement, the Parties agree that the venue shall be the state courts of Kentucky or the U.S. District Court for the Western District of Kentucky, Louisville Division. All parties expressly consent to personal jurisdiction and venue in such Court for the limited and sole purpose of proceedings relating to this Agreement or any rights or obligations arising thereunder. Service of process may be accomplished by following the procedures prescribed by law.
- 2.22 **Ability to Meet Obligations:** Bidder affirmatively states that there are no actions, suits or proceedings of any kind pending against Bidder or, to the knowledge of the Bidder, threatened against Bidder before or by any court, governmental body or agency or other tribunal or authority which would, if adversely determined, have a materially adverse effect on the authority or ability of Bidder to perform its obligations under this Contract, or which question the legality, validity or enforceability hereof or thereof.

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SECTION 00400

EVALUATION AND BID FORM

**THE PARKLANDS OF FLOYDS FORK – PROJECT 4A
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The following information is for reference only. Please see the Bid Form to be submitted in Part IV Bid Forms of the KYTC Proposal Package.

TO:
Kentucky Transportation Cabinet (KYTC)
200 Mero Street
Frankfort, KY 40622
(Submit Bids per Kentucky Transportation Cabinet’s Expedite Bidding program)

I. BID CONDITIONS

The undersigned, having familiarized himself with the local conditions affecting the cost of work, and with the Request for Bids, General Conditions, Supplementary General Conditions, Specifications and the Drawings, hereby proposes to furnish all materials and labor for the job described above in strict accordance with the Drawings and Specifications, including:

Addendum No. _____ Dated _____
Addendum No. _____ Dated _____

II. PREQUALIFICATION AND EVALUATION CRITERIA

See the Kentucky Transportation Cabinet Standard Specifications for Road and Bridge Construction, current edition, Divisions 102 and 103.

III. COMPLETION OF WORK AND PAYMENTS TO CONTRACTOR

If undersigned is notified of Bid acceptance within ninety (90) days after the Bid date, he/she agrees to execute a contract for work as awarded for the stated compensation. The undersigned agrees, if awarded Contract, to begin work within fifteen (15) calendar days from the notice to begin work. Upon award of contract, contractor shall submit to Owner a Schedule of Values for review and approval. Contractor shall submit invoices monthly based on work completed in accordance with the approved Schedule of Values.

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V. STIPULATED SUMS

A. BASE BID (all-inclusive)

The undersigned agrees to fulfill the terms of the contract to perform work for the stipulated lump sum of:

(Written) _____

(Numeric) _____ (\$ _____)

DEMOBILIZATION (included in Base Bid above)

3% of Contract Sum _____ (\$ _____)

B. TIME

The undersigned agrees to fulfill the terms of the contract within _____ days of the Notice to Proceed.

Number of Days X \$1,000/day _____ (\$ _____)

C. “A” + “B” (COSTS + TIME)

A. (Base Bid) + B. (Time) _____ (\$ _____)

D. ALTERNATES

The Alternates are described in Section 012300 ALTERNATES.

Add-Alternate No. 1: The Strand 2-Hole Trailhead, Plaza,
Site Walls, Parking Lot Lighting, and Parking Lot: (\$ _____)

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E. UNIT PRICES

The Unit Price List provided in Section 012200 UNIT PRICES is for reference only and is not to be submitted with the Bid Form. The apparent-awarded contractor will be required to submit the completed final Unit Price List to the Owner for review and concurrence prior to proceeding as stated in the contract agreements.

The unit prices shall apply to either additional work or deletions from the Contract. Unit prices shall include all labor and materials complete and in place and all other items of cost including removal of excess materials from the site, overhead and profit and shall constitute complete reimbursement to the contractor for additional work or for credit to the Owner for work omitted, as the case may be.

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SECTION 00500

BONDS, CERTIFICATES AND ADMINISTRATIVE FORMS

Part 1 – General:

Related Work Specified Elsewhere:

Section 00100 Invitation and Instruction to Bidders
Section 00400 Bid Form
Section 00600 Standard Form of Agreement between Owner and Contractor
Section 00700 General Conditions

Forms Submitted By Contractor:

Reference is made throughout this project manual to a number of standard forms which the Contractor is required to submit to the Owner prior to and during the execution of work of this Project.

The Contractor shall be responsible for obtaining and submitting the following forms to the Owner when the forms are completed as specified:

Prior to commencing work:

- a. AIA Document G715 "Acord Certificate of Insurance" (1991 Edition).
- b. AIA Document A312 "Performance Bond and Payment bond" (1984 Edition).

During the execution of the work, as appropriate, and prior to final payment:

- a. Modified AIA Document G702 "Application and Certificate for Payment". (Sample Enclosed)
- b. Modified AIA Document G703 "Continuation Sheet" for G702, "Application and Certificate for Payment". (Sample Enclosed)
- c. AIA Document G706 "Contractor's Affidavit of Payment of Debts and Claims" (1994 Edition).
- d. AIA Document G706A "Contractor's Affidavit of Release of Liens" (1994 Edition).
- e. AIA Document G707 "Consent of Surety to Final Payment" (1994 Edition).
- f. AIA document G707A "Consent of Surety to Reduction in or Partial Release of Retainage" (1994 Edition).
- g. Payroll Report (this is typically required on some government projects)

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The forms specified above are available for examination in the Owner's office by prospective bidders. Failure to examine the specified documents and to make allowances for them in his bid, shall not relieve the Contractor from using the forms and complying with their requirements.

Forms Prepared by Owner:

The Owner shall prepare the following standard forms, as appropriate:

- a. AIA Document G701 "Change Order" (1987 Edition).
- b. AIA Document G704 "Certificate of Substantial Completion" (1992 Edition).
- c. AIA Document G714 "Construction Change Directive" (1987 Edition).

AIA[®] Document A312[™] – 2010

Performance Bond

CONTRACTOR:
(Name, legal status and address)

SURETY:
(Name, legal status and principal place of business)

OWNER:
(Name, legal status and address)

CONSTRUCTION CONTRACT

Date:
Amount: \$
Description:
(Name and location)

BOND

Date:
(Not earlier than Construction Contract Date)

Amount: \$
Modifications to this Bond: None See Section 16

CONTRACTOR AS PRINCIPAL
Company: *(Corporate Seal)*

SURETY
Company: *(Corporate Seal)*

Signature: _____
Name and Title:
(Any additional signatures appear on the last page of this Performance Bond.)

Signature: _____
Name and Title:

(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or BROKER:

OWNER'S REPRESENTATIVE:
(Architect, Engineer or other party:)

ADDITIONS AND DELETIONS:

The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

§ 2 If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Section 3.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after

- .1 the Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Section 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;
- .2 the Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and
- .3 the Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

§ 4 Failure on the part of the Owner to comply with the notice requirement in Section 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

§ 5 When the Owner has satisfied the conditions of Section 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

§ 5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

§ 5.2 Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

§ 5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Section 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

§ 5.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances:

- .1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or
- .2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

§ 6 If the Surety does not proceed as provided in Section 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Section 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

§ 7 If the Surety elects to act under Section 5.1, 5.2 or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication, for

- .1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;
- .2 additional legal, design professional and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Section 5; and
- .3 liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

§ 8 If the Surety elects to act under Section 5.1, 5.3 or 5.4, the Surety's liability is limited to the amount of this Bond.

§ 9 The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors and assigns.

§ 10 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 11 Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

§ 12 Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

§ 13 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

§ 14 Definitions

§ 14.1 **Balance of the Contract Price.** The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made, including allowance to the Contractor of any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

§ 14.2 **Construction Contract.** The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

§ 14.3 **Contractor Default.** Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

§ 14.4 **Owner Default.** Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 14.5 **Contract Documents.** All the documents that comprise the agreement between the Owner and Contractor.

§ 15 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 16 Modifications to this bond are as follows:

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL

Company: _____ (Corporate Seal)

Signature: _____

Name and Title: _____

Address: _____

SURETY

Company: _____ (Corporate Seal)

Signature: _____

Name and Title: _____

Address: _____

Additions and Deletions Report for **AIA[®] Document A312[™] – 2010**

This Additions and Deletions Report, as defined on page 1 of the associated document, reproduces below all text the author has added to the standard form AIA document in order to complete it, as well as any text the author may have added to or deleted from the original AIA text. Added text is shown underlined. Deleted text is indicated with a horizontal line through the original AIA text.

Note: This Additions and Deletions Report is provided for information purposes only and is not incorporated into or constitute any part of the associated AIA document. This Additions and Deletions Report and its associated document were generated simultaneously by AIA software at 09:38:02 on 12/22/2010.

There are no differences.

Certification of Document's Authenticity

AIA® Document D401™ – 2003

I, _____, hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 09:38:02 on 12/22/2010 under Order No. 5322277519_1 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A312™ – 2010, Performance Bond, as published by the AIA in its software, other than those additions and deletions shown in the associated Additions and Deletions Report.

(Signed)

(Title)

(Dated)

AIA[®] Document A312[™] – 2010

Payment Bond

CONTRACTOR:
(Name, legal status and address)

SURETY:
(Name, legal status and principal place of business)

OWNER:
(Name, legal status and address)

CONSTRUCTION CONTRACT

Date:
Amount: \$
Description:
(Name and location)

BOND

Date:
(Not earlier than Construction Contract Date)

Amount: \$
Modifications to this Bond: None See Section 18

CONTRACTOR AS PRINCIPAL
Company: *(Corporate Seal)*

SURETY
Company: *(Corporate Seal)*

Signature: _____
Name and
Title:

Signature: _____
Name and
Title:

(Any additional signatures appear on the last page of this Payment Bond.)

(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or BROKER:

OWNER'S REPRESENTATIVE:
(Architect, Engineer or other party:)

ADDITIONS AND DELETIONS:

The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner to pay for labor, materials and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.

§ 2 If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies and holds harmless the Owner from claims, demands, liens or suits by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Section 13) of claims, demands, liens or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract and tendered defense of such claims, demands, liens or suits to the Contractor and the Surety.

§ 4 When the Owner has satisfied the conditions in Section 3, the Surety shall promptly and at the Surety's expense defend, indemnify and hold harmless the Owner against a duly tendered claim, demand, lien or suit.

§ 5 The Surety's obligations to a Claimant under this Bond shall arise after the following:

§ 5.1 Claimants, who do not have a direct contract with the Contractor,

- .1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and
- .2 have sent a Claim to the Surety (at the address described in Section 13).

§ 5.2 Claimants, who are employed by or have a direct contract with the Contractor, have sent a Claim to the Surety (at the address described in Section 13).

§ 6 If a notice of non-payment required by Section 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Section 5.1.1.

§ 7 When a Claimant has satisfied the conditions of Sections 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:

§ 7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and

§ 7.2 Pay or arrange for payment of any undisputed amounts.

§ 7.3 The Surety's failure to discharge its obligations under Section 7.1 or Section 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Section 7.1 or Section 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.

§ 8 The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Section 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

§ 9 Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.

§ 10 The Surety shall not be liable to the Owner, Claimants or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to, or give notice on behalf of, Claimants or otherwise have any obligations to Claimants under this Bond.

§ 11 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 12 No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Section 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

§ 13 Notice and Claims to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.

§ 14 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

§ 15 Upon request by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

§ 16 Definitions

§ 16.1 Claim. A written statement by the Claimant including at a minimum:

- .1 the name of the Claimant;
- .2 the name of the person for whom the labor was done, or materials or equipment furnished;
- .3 a copy of the agreement or purchase order pursuant to which labor, materials or equipment was furnished for use in the performance of the Construction Contract;
- .4 a brief description of the labor, materials or equipment furnished;
- .5 the date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
- .6 the total amount earned by the Claimant for labor, materials or equipment furnished as of the date of the Claim;
- .7 the total amount of previous payments received by the Claimant; and
- .8 the total amount due and unpaid to the Claimant for labor, materials or equipment furnished as of the date of the Claim.

§ 16.2 Claimant. An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials or equipment were furnished.

§ 16.3 Construction Contract. The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

§ 16.4 **Owner Default.** Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 16.5 **Contract Documents.** All the documents that comprise the agreement between the Owner and Contractor.

§ 17 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 18 Modifications to this bond are as follows:

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL

Company: _____ (Corporate Seal)

Signature: _____
Name and Title: _____
Address: _____

SURETY

Company: _____ (Corporate Seal)

Signature: _____
Name and Title: _____
Address: _____

Additions and Deletions Report for AIA[®] Document A312[™] – 2010

This Additions and Deletions Report, as defined on page 1 of the associated document, reproduces below all text the author has added to the standard form AIA document in order to complete it, as well as any text the author may have added to or deleted from the original AIA text. Added text is shown underlined. Deleted text is indicated with a horizontal line through the original AIA text.

Note: This Additions and Deletions Report is provided for information purposes only and is not incorporated into or constitute any part of the associated AIA document. This Additions and Deletions Report and its associated document were generated simultaneously by AIA software at 09:40:32 on 12/22/2010.

There are no differences.

Certification of Document's Authenticity

AIA® Document D401™ – 2003

I, _____, hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 09:40:32 on 12/22/2010 under Order No. 5322277519_1 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A312™ – 2010, Payment Bond, as published by the AIA in its software, other than those additions and deletions shown in the associated Additions and Deletions Report.

(Signed)

(Title)

(Dated)



Application and Certificate for Payment

TO OWNER: 21st Century Parks, Inc
471 West Main Street, Suite 202
Louisville, KY 40202

PROJECT: The Parklands of Floyds Fork - Project
4A

APPLICATION NO: 001
PERIOD TO:

FROM CONTRACTOR: 15712 Shelbyville Road
Louisville, KY 40245

VIA ARCHITECT: Wallace Roberts & Todd, LLC
1700 Market Street, 28th Floor
Philadelphia, PA 19103

Distribution to:
OWNER:
ARCHITECT:
CONTRACTOR:
FIELD:
OTHER:

CONTRACT FOR: General Construction
CONTRACT DATE:
PROJECT NOS: / /

CONTRACTOR'S APPLICATION FOR PAYMENT

Application is made for payment, as shown below, in connection with the Contract. Continuation Sheet, AIA Document G703, is attached.

- 1. ORIGINAL CONTRACT SUM \$ 0.00
- 2. NET CHANGE BY CHANGE ORDERS \$ 0.00
- 3. CONTRACT SUM TO DATE (Line 1 ± 2) \$ 0.00
- 4. TOTAL COMPLETED & STORED TO DATE (Column G on G703) \$ 0.00

5. RETAINAGE:

- a. 0 % of Completed Work
(Column D + E on G703) \$ 0.00
- b. 0 % of Stored Material
(Column F on G703) \$ 0.00

Total Retainage (Lines 5a + 5b or Total in Column I of G703) \$ 0.00

- 6. TOTAL EARNED LESS RETAINAGE \$ 0.00
(Line 4 Less Line 5 Total)

7. LESS PREVIOUS CERTIFICATES FOR PAYMENT \$ 0.00
(Line 6 from prior Certificate)

- 8. CURRENT PAYMENT DUE \$ 0.00

9. BALANCE TO FINISH, INCLUDING RETAINAGE
(Line 3 less Line 6)

\$ 0.00

| CHANGE ORDER SUMMARY | ADDITIONS | DEDUCTIONS |
|--|----------------|----------------|
| Total changes approved in previous months by Owner | \$ 0.00 | \$ 0.00 |
| Total approved this Month | \$ 0.00 | \$ 0.00 |
| TOTALS | \$ 0.00 | \$ 0.00 |
| NET CHANGES by Change Order | \$ | 0.00 |

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

CONTRACTOR:

By: _____ Date: _____
State of: _____

County of:

Subscribed and sworn to before
me this _____ day of _____

Notary Public:

My Commission expires: _____

ARCHITECT'S CERTIFICATE FOR PAYMENT

In accordance with the Contract Documents, based on on-site observations and the data comprising this application, the Architect certifies to the Owner that to the best of the Architect's knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the AMOUNT CERTIFIED.

AMOUNT CERTIFIED \$ 0.00
(Attach explanation if amount certified differs from the amount applied. Initial all figures on this Application and on the Continuation Sheet that are changed to conform with the amount certified.)

ARCHITECT:

By: _____ Date: _____

This Certificate is not negotiable. The AMOUNT CERTIFIED is payable only to the Contractor named herein. Issuance, payment and acceptance of payment are without prejudice to any rights of the Owner or Contractor under this Contract.

AIA Document G702™ - 1992. Copyright © 1953, 1963, 1965, 1971, 1978, 1983 and 1992 by The American Institute of Architects. All rights reserved. WARNING: This AIA® Document is protected by U.S. Copyright Law and International Treaties. Unauthorized reproduction or distribution of this AIA® Document, or any portion of it, may result in severe civil and criminal penalties, and will be prosecuted to the maximum extent possible under the law. This document was produced by AIA software at 09:40:32 on 12/21/2010 under Order No.5322277519_1 which expires on 06/10/2011, and is not for resale.
(2020756098)

**THE PARKLANDS OF FLOYDS FORK – PROJECT 4A
THE STRAND, TURKEY RUN PARK & BROAD RUN PARK**

SECTION 00600

STANDARD FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

The standard form of agreement between the Owner and the Contractor of this contract is the American Institute of Architects' Document A101-2007, "Standard Form of Agreement between Owner and Contractor", consisting of 10 articles as follows.

Section 00600 also includes the following:

- Exhibit A: The Specification Table of Contents
- Exhibit B: The Drawing List and Sheet Number
- First Addendum to Construction Agreement
- Second Addendum to Construction Agreement

DRAFT AIA® Document A101™ - 2007

Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum

AGREEMENT made as of the « » day of « » in the year « »
(In words, indicate day, month and year.)

BETWEEN the Owner:
(Name, legal status, address and other information)

21st Century Parks, Inc., a Kentucky non-profit corporation
Attn: Joe Daley
471 West Main Street
Suite 202
Louisville, Kentucky 40202«-»«-»

«-»
«-»
«-»

and the Contractor:
(Name, legal status, address and other information)

« »« »
« »
« »
« »

for the following Project:
(Name, location and detailed description)

Parklands of Floyd's Fork – Project
Louisville, Jefferson County, Kentucky

«123»
«-»
«-»

The Architect:
(Name, legal status, address and other information)

Wallace Roberts & Todd, LLC
1700 Market Street
28th Floor
Philadelphia, Pennsylvania 19103

«-»«-»
«-»
«-»
«-»

The Owner and Contractor agree as follows.

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

AIA Document A201™-2007, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

ELECTRONIC COPYING of any portion of this AIA® Document to another electronic file is prohibited and constitutes a violation of copyright laws as set forth in the footer of this document.

TABLE OF ARTICLES

- 1 THE CONTRACT DOCUMENTS
- 2 THE WORK OF THIS CONTRACT
- 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION
- 4 CONTRACT SUM
- 5 PAYMENTS
- 6 DISPUTE RESOLUTION
- 7 TERMINATION OR SUSPENSION
- 8 MISCELLANEOUS PROVISIONS
- 9 ENUMERATION OF CONTRACT DOCUMENTS
- 10 INSURANCE AND BONDS

ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9.

ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be the date of this Agreement unless a different date is stated below or provision is made for the date to be fixed in a notice to proceed issued by the Owner.

(Insert the date of commencement if it differs from the date of this Agreement or, if applicable, state that the date will be fixed in a notice to proceed.)

←→Date of commencement will be provided in the notice to proceed issued by Owner.

If, prior to the commencement of the Work, the Owner requires time to file mortgages and other security interests, the Owner's time requirement shall be as follows:

« »

§ 3.2 The Contract Time shall be measured from the date of commencement.

§ 3.3 The Contractor shall achieve Substantial Completion of the entire Work not later than « » (« ») days from the date of commencement, or as follows:

(Insert number of calendar days. Alternatively, a calendar date may be used when coordinated with the date of commencement. If appropriate, insert requirements for earlier Substantial Completion of certain portions of the Work.)

« »

| Portion of Work | Substantial Completion Date |
|-----------------|-----------------------------|
| | |

, subject to adjustments of this Contract Time as provided in the Contract Documents.
(Insert provisions, if any, for liquidated damages relating to failure to achieve Substantial Completion on time or for bonus payments for early completion of the Work.)

~~Failure to achieve Substantial Completion within the Contract Time shall result in liquidated damages imposed upon Contractor equal to \$1,000 per day.~~

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be ~~« »~~ (\$ ~~« »~~), subject to additions and deductions as provided in the Contract Documents.

§ 4.2 The Contract Sum is based upon the following alternates, if any, which are described in the Contract Documents and are hereby accepted by the Owner:
(State the numbers or other identification of accepted alternates. If the bidding or proposal documents permit the Owner to accept other alternates subsequent to the execution of this Agreement, attach a schedule of such other alternates showing the amount for each and the date when that amount expires.)

~~« »~~

§ 4.3 Unit prices, if any:
(Identify and state the unit price; state quantity limitations, if any, to which the unit price will be applicable.)

| Item | Units and Limitations | Price Per Unit (\$0.00) |
|------|-----------------------|-------------------------|
| | | |

§ 4.4 Allowances included in the Contract Sum, if any: NONE
(Identify allowance and state exclusions, if any, from the allowance price.)

| Item | Price |
|------|-------|
| | |

ARTICLE 5 PAYMENTS

§ 5.1 PROGRESS PAYMENTS

§ 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

~~« »~~

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the ~~« »~~ 5th day of a month, the Owner shall make payment of the certified amount to the Contractor not later than the ~~« »~~ 20th day of the ~~« »~~ same month. If an Application for Payment is received by the Architect after the application date fixed above, payment shall be made by the Owner not later than ~~« »~~ thirty (~~« »~~ 30) days after the Architect receives the Application for Payment.
(Federal, state or local laws may require payment within a certain period of time.)

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form and supported

by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.5 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.6 Subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

- .1 Take that portion of the Contract Sum properly allocable to completed Work as determined by multiplying the percentage completion of each portion of the Work by the share of the Contract Sum allocated to that portion of the Work in the schedule of values, less retainage of ~~ten~~ percent (~~←→~~ 10%). Pending final determination of cost to the Owner of changes in the Work, amounts not in dispute shall be included as provided in Section 7.3.9 of AIA Document A201™-2007, General Conditions of the Contract for Construction;
- .2 Add that portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction (or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing), less retainage of ~~ten~~ percent (~~←→~~ 10 %);
- .3 Subtract the aggregate of previous payments made by the Owner; and
- .4 Subtract amounts, if any, for which the Architect has withheld or nullified a Certificate for Payment as provided in Section 9.5 of AIA Document A201-2007.

§ 5.1.7 The progress payment amount determined in accordance with Section 5.1.6 shall be further modified under the following circumstances:

- .1 Add, upon Substantial Completion of the Work, a sum sufficient to increase the total payments to the full amount of the Contract Sum, less such amounts as the Architect shall determine for incomplete Work, retainage applicable to such work and unsettled claims; and
(Section 9.8.5 of AIA Document A201-2007 requires release of applicable retainage upon Substantial Completion of Work with consent of surety, if any.)
- .2 Add, if final completion of the Work is thereafter materially delayed through no fault of the Contractor, any additional amounts payable in accordance with Section 9.10.3 of AIA Document A201-2007.

§ 5.1.8 Reduction or limitation of retainage, if any, shall be as follows:

(If it is intended, prior to Substantial Completion of the entire Work, to reduce or limit the retainage resulting from the percentages inserted in Sections 5.1.6.1 and 5.1.6.2 above, and this is not explained elsewhere in the Contract Documents, insert here provisions for such reduction or limitation.)

~~←Owner will withhold no more than ten percent (10%) retainage from the amount of any undisputed payment due until fifty percent (50%) of the Work is completed and no more than five percent (5%) retainage of the total contract amount after fifty-one percent (51%) of the Work is completed.→~~

§ 5.1.9 Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

§ 5.2 FINAL PAYMENT

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

- .1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Section 12.2.2 of AIA Document A201-2007, and to satisfy other requirements, if any, which extend beyond final payment; and
- .2 a final Certificate for Payment has been issued by the Architect.

§ 5.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect's final Certificate for Payment, or as follows:

←→

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 INITIAL DECISION MAKER

The Architect will serve as Initial Decision Maker pursuant to Section 15.2 of AIA Document A201–2007, unless the parties appoint below another individual, not a party to this Agreement, to serve as Initial Decision Maker.
(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

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§ 6.2 BINDING DISPUTE RESOLUTION

For any Claim subject to, but not resolved by, mediation pursuant to Section 15.3 of AIA Document A201–2007, the method of binding dispute resolution shall be as follows:
(Check the appropriate box. If the Owner and Contractor do not select a method of binding dispute resolution below, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.)

- Arbitration pursuant to Section 15.4 of AIA Document A201–2007
- Litigation in a court of competent jurisdiction
- Other *(Specify)*
-

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ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201–2007.

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2007.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2007 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.
(Insert rate of interest agreed upon, if any.)

«↔Five percent (5%-%↔) per annum

§ 8.3 The Owner’s representative:
(Name, address and other information)

«↔Joe Daley↔
«↔Project Manager
«↔471 West Main Street
«↔Suite 203↔
«↔Louisville, Kentucky 40202↔
«↔(502) 584-3912↔

§ 8.4 The Contractor’s representative:
(Name, address and other information)

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§ 8.5 Neither the Owner's nor the Contractor's representative shall be changed without ten days written notice to the other party.

§ 8.6 Other provisions:

See the attached First Addendum to Construction Agreement and, if applicable, Second Addendum to Construction Agreement. In the event of any conflict, the terms of the applicable Addendum shall control.

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 The Contract Documents, except for Modifications issued after execution of this Agreement, are enumerated in the sections below.

§ 9.1.1 The Agreement is this executed AIA Document A101-2007, Standard Form of Agreement Between Owner and Contractor.

§ 9.1.2 The General Conditions are AIA Document A201-2007, General Conditions of the Contract for Construction.

§ 9.1.3 The Supplementary and other Conditions of the Contract:

| Document | Title | Date | Pages |
|----------|-------|------|-------|
| | | | |

§ 9.1.4 The Specifications:
(Either list the Specifications here or refer to an exhibit attached to this Agreement.)

The Specifications are listed on Exhibit A attached hereto and made a part hereof.

| Section | Title | Date | Pages |
|---------|-------|------|-------|
| | | | |

§ 9.1.5 The Drawings:
(Either list the Drawings here or refer to an exhibit attached to this Agreement.)

The Drawings are listed on Exhibit B attached hereto and made a part hereof.

| Number | Title | Date |
|--------|-------|------|
| | | |

§ 9.1.6 The Addenda, if any:

| Number | Date | Pages |
|--------|------|-------|
| | | |

Portions of Addenda relating to bidding requirements are not part of the Contract Documents unless the bidding requirements are also enumerated in this Article 9.

§ 9.1.7 Additional documents, if any, forming part of the Contract Documents:

- .1 AIA Document E201™-2007, Digital Data Protocol Exhibit, if completed by the parties, or the following:

<< >>

- .2 Other documents, if any, listed below:
(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201–2007 provides that bidding requirements such as advertisement or invitation to bid, Instructions to Bidders, sample forms and the Contractor’s bid are not part of the Contract Documents unless enumerated in this Agreement. They should be listed here only if intended to be part of the Contract Documents.)

<< >>

ARTICLE 10 INSURANCE AND BONDS

The Contractor shall purchase and maintain insurance and provide bonds as set forth in Article 11 of AIA Document A201–2007.
(State bonding requirements, if any, and limits of liability for insurance required in Article 11 of AIA Document A201–2007.)

| Type of insurance or bond | Limit of liability or bond amount (\$0.00) |
|-------------------------------|--|
| Payment and Performance Bonds | Contract Sum |

This Agreement entered into as of the day and year first written above.

21ST CENTURY PARKS, INC.,

OWNER (Signature)

«» Daniel H. Jones, President
(Printed name and title)

CONTRACTOR (Signature)

« »« »
(Printed name and title)

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EXHIBIT A TO
AIA FORM A101 FOR
THE PARKLANDS OF FLOYDS FORK – PROJECT 4A

SPECIFICATIONS

| DIVISION | SECTION TITLE | PAGES |
|---|--|------------------|
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| 00002- | Project Description..... | 00002-1 thru 2 |
| 00003- | Site Maps..... | 00003-1 thru 4 |
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| 00100- | Invitation and Instructions to Bidders..... | 00100-1 thru 2 |
| 00200- | General Provisions..... | 00200-1 thru 3 |
| 00400- | Evaluation and Bid Form..... | 00400-1 thru 3 |
| 00500- | Bonds, Certificates and Administrative Forms..... | 00500-1 thru 15 |
| 00600- | Standard Form of Agreement between Owner and Contractor..... | 00600-1 thru 40 |
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| 00800- | Information Available to Bidders..... | 00800-1 thru 1 |
| DIVISION 01 – GENERAL REQUIREMENTS | | |
| 011000- | Summary..... | 011000-1 thru 4 |
| 012200- | Unit Prices..... | 012200-1 thru 10 |
| 012300- | Alternates..... | 012300-1 thru 2 |
| 012500- | Substitution Procedures..... | 012500-1 thru 3 |
| 012600- | Contract Modification Procedures..... | 012600-1 thru 3 |
| 012900- | Payment Procedures..... | 012900-1 thru 5 |
| 013100- | Project Management and Coordination..... | 013100-1 thru 8 |
| 013200- | Construction Progress Documentation..... | 013200-1 thru 7 |
| 013300- | Submittal Procedures..... | 013300-1 thru 10 |
| 014000- | Quality Requirements..... | 014000-1 thru 7 |
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| 017300- | Execution..... | 017300-1 thru 7 |
| 017329- | Cutting and Patching..... | 017329-1 thru 4 |
| 017419- | Construction Waste Management and Disposal..... | 017419-1 thru 2 |
| 017700- | Closeout Procedures..... | 017700-1 thru 5 |
| 017823- | Operation and Maintenance Data..... | 017823-1 thru 8 |
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| 024119- | Selective Demolition..... | 024119-1 thru 5 |
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033000- Cast-In-Place Concrete for Buildings and Miscellaneous Structures.....033000-1 thru 11
033001- Cast-In-Place Concrete for Bridge Structures and Slabs.....033001-1 thru 1
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044302- Dry Laid Stone Headwalls and Endwalls.....044302-1 thru 3
047200- Cast Stone..... 047200-1 thru 7

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051201- Structural Strand Cables.....051201-1 thru 4
051202- Wire Rope Mesh Posts.....051202-1 thru 4
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EXHIBIT B TO
AIA FORM A101 FOR
THE PARKLANDS OF FLOYDS FORK – PROJECT 4A

DRAWING LIST

VOLUME 1

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| 70 | SH-C6.1 | Sugar Hill Enlarged Plans |
| 71 | SC-C0.1 | Silo Center Cover Sheet |
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| 73 | SC-C2.1 | Silo Center Demolition and Tree Preservation |
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| 4 | G0.4 | Key Index Plan - 40 Scale |
| 5 | G0.5 | Key Index Plan - Park Road |
| 6 | G0.6 | Key Index Plan - Louisville Loop |
| 7 | G0.7 | Key Index Plan - Excursion Trail |
| 8 | G0.8 | Bat Maternity Colony Buffer |
| 9 | G0.9 | Sheet Index - Volume I |

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| 10 | G0.10 | Sheet Index - Volume II |
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| 12 | G0.12 | Summary Sheet, General Notes and Legend |
| 13 | G0.13 | Summary Sheet, SWPPP Notes and Legend |
| 14 | LT-C0.1 | Loop Trail Cover |
| 15 | LT-C1.1 | Loop Trail Plan and Profile |
| 16 | LT-C1.2 | Loop Trail Plan and Profile |
| 17 | LT-C1.3 | Loop Trail Plan and Profile |
| 18 | LT-C1.4 | Loop Trail Plan and Profile |
| 19 | LT-C1.5 | Loop Trail Plan and Profile |
| 20 | LT-C1.6 | Loop Trail Plan and Profile |
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FIRST ADDENDUM TO CONSTRUCTION AGREEMENT

THIS FIRST ADDENDUM TO CONSTRUCTION AGREEMENT (the "**First Addendum**") is attached to and made a part of the Standard Form of Agreement Between Owner and Contractor, AIA Document A101—2007 (the "**Construction Agreement**") between 21ST CENTURY PARKS, INC., a Kentucky non-profit corporation ("**Owner**") and _____, a/an _____ ("**Contractor**") for the project known as the Parklands of Floyds Fork – Project 4A, The Strand, Turkey Run Park & Broad Run Park in Louisville, Jefferson County, Kentucky (the "**Project**").

WITNESSETH:

WHEREAS, Owner and Contractor desire to enter into this First Addendum to modify and/or supplement the terms of the Construction Agreement for the Project;

NOW THEREFORE, for in consideration of the foregoing recitals and in consideration of the covenants and undertakings of Owner and Contractor set forth in this First Addendum and the Construction Agreement, Owner and Contractor do hereby agree as follows:

1. **Capitalized Terms; Conflict.** All capitalized terms not otherwise defined herein shall have the meanings ascribed to such terms in the Construction Agreement or the General Conditions of the Contract for Construction, AIA Document A201-2007 (the "**General Conditions**"; the Construction Agreement, the General Conditions, the First Addendum and all other documents and agreements related thereto collectively referred to as the "**Contract Documents**"). In the event of any conflict or inconsistency between the terms of this First Addendum and the terms of the other Contract Documents, the terms of this First Addendum shall control.

2. **Final Approval Authority.** Owner has the final approval authority for (i) directing the "Work" as it relates to the Project and as such term is defined in the General Conditions and (ii) authorizing any and all "Change Orders", "Construction Change Directives" or minor changes in the Work as such terms are defined in the General Conditions.

3. **Date of Substantial Completion.** The date of Substantial Completion will be set as a specific date based upon the number of days from the Commencement Date as determined and provided by Owner to Contractor.

4. **Contract Sum.** The Construction Agreement is a stipulated sum contract. The Contract Sum is guaranteed by the Contractor not to exceed the amount stated in the Construction Agreement, subject to additions and deductions due to Change Orders.

5. **Progress Payments.** All Applications for Payment made by Contractor *after* the first progress payment from Owner shall be accompanied by partial lien releases from both Contractor and all subcontractors performing the Work for all previously paid amounts.

6. Change Orders. As stated above, all Change Orders must be approved by Owner. Contractor hereby acknowledges and agrees that no payment shall be due from Owner for any Change Order not approved by Owner. In addition, Change Orders shall incorporate unit pricing and there shall be no adjustment to unit pricing for any Change Order calculations.

7. Indemnification of Owner by Contractor. Contractor hereby fully indemnifies Owner and agrees to hold Owner harmless from all losses, expenses, claims, liabilities and costs, including, without limitation, reasonable attorneys' fees, now or hereafter incurred by Owner by reason of Contractor's or its subcontractor's actions in connection with the Work or breach of, or default under, the Contract Documents arising or accruing after the date of the Construction Agreement and relating to the Work or the obligations of Contractor or its subcontractors thereunder.

8. Termination. Owner has the full right and power to terminate the Construction Agreement in its reasonable discretion; provided, however, that Contractor shall be paid for all of the Work satisfactorily performed up to and including the date of termination of the Construction Agreement.

9. Insurance Requirements. Prior to the commencement of the Work, Contractor shall obtain at its own cost and expense the types of insurance set out below through insurance companies licensed in the Commonwealth of Kentucky and which have an A.M. Best Rating of no less than "B+VI" unless proper financial information relating to the company is submitted to and approved by Owner. Insurance written by non-admitted carriers will also be considered acceptable, in accordance with Kentucky Insurance Law (KRS 304.10-040). Workers' Compensation written through qualified group self-insurance programs in accordance with Kentucky Revised Statutes (KRS 342.350) will also be acceptable. Contractor and its subcontractors shall not commence the Work until all insurance required under the Contract Documents has been obtained and until copies of such policies (or certificates thereof in form and substance acceptable to Owner) are submitted to and approved by the Owner.

Without limiting Contractor's indemnification requirements under the Contract Documents, it is agreed that Contractor shall maintain in force at all times during the Work the following policy or policies of insurance covering its operations, and require its subcontractors to procure and maintain these same policies until completion of the Work. Owner may require Contractor to supply proof of subcontractors' insurance via Certificates of Insurance, or at Owner's option, actual copies of policies.

A. The following clause shall be added to Contractor's and its subcontractor's Commercial General Liability Policies:

[1] "21st Century Parks, Inc., its employees, agents and successors, and the Louisville/Jefferson County Metro Government, its elected and appointed officials, employees, agents and successors are added as "Additional Insureds" as respects operations of the Named Insured performed relative to the contract."

B. The insurance to be procured and maintained and minimum Limits of Liability shall be as follows, unless different limits are specified:

[1] COMMERCIAL GENERAL LIABILITY, a \$1,000,000 Combined Single Limit for any one occurrence for Bodily Injury, Personal Injury and Property Damage, and \$2,000,000 aggregate including:

- [a] Premises – Operations Coverage
- [b] Products and Completed Operations
- [c] Contractual Liability
- [d] Broad Form Property Damage
- [e] Independent Contractors Protective Liability
- [f] Personal Injury

[2] AUTOMOBILE LIABILITY, insuring all owned, non-owned and hired motor vehicles. The minimum coverage Liability Limit is \$1,000,000 Combined Single Limit for any one accident. The Limit of Liability may be subject to increase according to any applicable State or Federal Transportation Regulations.

[3] WORKERS' COMPENSATION insuring the employers' obligations under Kentucky Revised Statutes Chapter 342 at Statutory Limits, and EMPLOYERS' LIABILITY - \$100,000 each Accident/\$500,000 Disease – Policy Limit/\$100,000 Disease – each Employee.

[4] BUILDERS RISK INSURANCE (IF NEW BUILDING CONSTRUCTION OR STRUCTURAL RENOVATION). The Contractor must provide evidence of "Builders Risk" insurance coverage prior to beginning construction in either the form of a Certificate of Insurance acceptable to Owner or actual copies of policies. Contractor shall purchase an "All Risk" (Comprehensive Form including theft of building materials, flood, earthquake, and Building Ordinance coverage including loss to the undamaged portion of the improvements; demolition and removal costs of undamaged parts of the structure; and any increase cost of repairs or reconstruction) Builders Risk policy with Limits of Liability equaling the full estimated Replacement Cost of the improvements being constructed or full renovation costs including the Actual Cash Value of existing improvement(s), plus Replacement Cost of labor and materials. The policy shall list Owner and, if applicable, the Louisville/Jefferson County Metro Government ("Louisville Metro") as "Named Insured/Owner". The maximum deductible which may be purchased by the Contractor under this policy is \$250,000 or 5% of the

total amount of the Contract Sum, whichever is less, and Contractor shall be solely responsible for reimbursing Owner and, if applicable, the Louisville Metro for the deductible amount should the improvements be damaged by fire or other peril prior to completion of work and acceptance by 21st Century Parks, Inc.

[5] PROFESSIONAL SERVICES INSURANCE REQUIREMENT. If the Contractor is authorized to subcontract portions of the Work to be performed under the Contract Documents to subcontractors relied upon principally because of the professional services rendered by their firm (such as but not limited to, surveyors, civil, structural, geotechnical or other professional engineering services), the Contractor shall also require that these subcontractors provide proof to the Contractor, via a Certificate of Insurance acceptable to Owner, that the subcontractor has purchased Professional Liability (Errors and Omissions) insurance, which includes a minimum Limit of Liability of \$1,000,000 per claim and aggregate, in addition to the other types of insurance referenced above for subcontractors. The Contractor is responsible for obtaining and maintaining copies of these Certificates of Insurance until final acceptance of work by Owner, and for making these Certificates available to Owner, upon request.

C. Contractor shall procure and maintain insurance policies as described herein and for which Owner shall be furnished Certificates of Insurance acceptable to Owner prior to the commencement of the Work. The Certificates of Insurance shall include provisions stating that the policies may not be cancelled without Owner and Louisville Metro having been provided at least thirty (30) days written notice. The Certificates of Insurance shall include the name and address of the person executing the Certificate of Insurance as well as the person's signature. If policies expire before the completion of the Work, renewal Certificates of Insurance shall be furnished to Owner at least thirty (30) days prior to the expiration of any policy(s).

D. Contractor agrees that it will not materially alter any of the insurance policies currently in force and relied on under the Contract Documents. Further, Contractor will not reduce any coverage amount below the limits required in this First Addendum.

E. Approval of the insurance by Owner shall not in any way relieve or decrease the liability of Contractor hereunder. It is expressly understood that Owner does not in any way represent that the specified Limits of Liability or coverage or policy forms are sufficient or adequate to protect the interest or liabilities of Contractor.

10. Kentucky Fairness in Construction Act. Owner and Contractor hereby agree to comply with the provisions of the Kentucky Fairness in Construction Act, sections 371.400-.425 of the Kentucky Revised Statutes ("**KRS**"), as if the same were fully set forth and incorporated herein as part of the Construction Agreement and this First Addendum, including, without limitation, the provision in KRS § 371.410 stating

that Owner, Contractor or any subcontractor may withhold no more than ten percent (10%) retainage from the amount of any undisputed payment due until fifty percent (50%) of the Work is completed and no more than five percent (5%) retainage of the total contract amount after fifty-one percent (51%) of the Work is completed.

11. Waiver of Escrow Requirement for Retainage. Contractor hereby waives the requirement under KRS § 371.160 that retainage be held in a separate escrow account.

[Signatures on following page.]

IN WITNESS WHEREOF, the parties have executed this First Addendum as of
the ____ day of _____, 2013.

OWNER:

21st CENTURY PARKS, INC.,
a Kentucky non-profit corporation

By: _____
Daniel H. Jones, President

CONTRACTOR:

_____,
a/an _____

By: _____

Name: _____

Title: _____

SECOND ADDENDUM TO CONSTRUCTION AGREEMENT

THIS SECOND ADDENDUM TO CONSTRUCTION AGREEMENT (the "**Second Addendum**") is attached to and made a part of the Standard Form of Agreement Between Owner and Contractor, AIA Document A102—2007 (the "**Construction Agreement**") between 21ST CENTURY PARKS, INC., a Kentucky non-profit corporation ("**Owner**") and _____, a/an _____ ("**Contractor**") for the project known as the Parklands of Floyds Fork – Project 4A, The Strand, Turkey Run Park 7 Broad Run Park in Louisville, Jefferson County, Kentucky (the "**Project**").

WITNESSETH:

WHEREAS, through federal funds provided on an annual basis by the Federal Highway Administration ("**FHWA**"), the Kentucky Transportation Cabinet (the "**KYTC**") will reimburse Owner for certain costs spent by Owner in connection with the Project;

WHEREAS, in order to receive such reimbursements from KYTC, any agreements entered into by Owner with contractors working on the Project must comply with certain federal and state laws applicable to projects funded by the FHWA;

WHEREAS, Owner and Contractor desire to enter into this Second Addendum to modify and/or supplement the terms of the Construction Agreement and the First Addendum to Construction Agreement (the "**First Addendum**") to comply with such federal and state laws applicable to the Project for FHWA funding;

NOW THEREFORE, for in consideration of the foregoing recitals and in consideration of the covenants and undertakings of Owner and Contractor set forth in this Second Addendum, the Construction Agreement, and the First Addendum, Owner and Contractor do hereby agree as follows:

1. **Capitalized Terms; Conflict.** All capitalized terms not otherwise defined herein shall have the meanings ascribed to such terms in the Construction Agreement, the First Addendum or the General Conditions of the Contract for Construction, AIA Document A201-2007 (the "**General Conditions**"; the Construction Agreement, the General Conditions, the First Addendum, the Second Addendum and all other documents and agreements related thereto collectively referred to as the "**Contract Documents**"). In the event of any conflict or inconsistency between the terms of this Second Addendum and the terms of the other Contract Documents, the terms of this Second Addendum shall control.

2. **Accounting Practices and Recordkeeping; Applications for Payment.** Contractor shall keep full and detailed records and accounts related to the cost of the Work and shall preserve such records and accounts for a period of three (3) years after receipt of final payment. Contractor hereby agrees to make such records and accounts available to Owner, if requested, and acknowledges that such records and accounts are subject to review by KYTC and other governmental agencies or their duly authorized

representatives. The accounting and control systems used by Contractor must be satisfactory to Owner and in accordance with generally accepted accounting principles. All Applications for Payment made by Contractor shall be accompanied by (i) an invoice and two (2) copies of adequate documentation for the costs shown on such invoice and (ii) partial lien releases from both Contractor and all subcontractors performing the Work for all previously paid amounts.

3. Compliance with Federal Law. Owner and Contractor hereby agree that the terms of the Contract Documents as well as the completion of the Work and the conduct of the parties under such Contract Documents must be in accordance with all applicable statutes, regulations, directives, policies, guidelines, procedures, and other program or technical provisions issued by or governing the FHWA and/or applicable to Federal-aid funded projects like the Project, including but not limited to the following:

- A. the National Environmental Policy Act of 1969;
- B. the Davis-Bacon Act and related acts, including but not limited to the requirement that the Contractor and all subcontractors shall pay the various classes of laborers and mechanics employed to do the Work the wage rates and fringe benefits determined by the Secretary of Labor to be prevailing for corresponding classes of employees engaged on similar projects in the locality and that the applicable wage determination be included in the applicable contract;
- C. the Contract Work Hours and Safety Standards Act, including but not limited to the weekly overtime pay requirements and the restriction that no laborer or mechanic employed in the performance of the Work shall be required to work in surroundings or under working conditions that are unsanitary, hazardous, or dangerous to health or safety;
- D. the Copeland "Anti-Kickback" Act, including but not limited to the restriction that no person working on a Federally funded or assisted construction project shall be required to give up any part of the compensation to which he or she is entitled under his or her contract of employment;
- E. Title VI of the Civil Rights Act of 1964 (78 Stat. 252) and the Regulations of the United States Department of Transportation issued thereunder (CFR Title 49, Subtitle A, Part 21);
- F. Equal employment opportunity requirements set forth under laws, executive orders, rules, regulations and orders of the Secretary of Labor including but not limited to the Equal Opportunity Construction Contract Specifications set forth under 41 CFR 60-4.3, and including but not limited to the requirement not to discriminate against any employee or applicant for employment because of race, religion, color, sex, national origin, age, or disability and the requirement to take affirmative action to ensure that applicants are employed and employees are treated during employment without regard to their race, religion, color, sex, national origin, age, or disability, such affirmative actions including but not limited to employment, upgrading, demotion, transfer, recruitment,

recruitment advertising, layoff, termination, rates of pay or other forms of compensation and selection of training;

G. the Disadvantaged Business Enterprise (“**DBE**”) requirements contained in 49 CFR Part 26; and

H. the American with Disabilities Act of 1990 and Section 504 of the Rehabilitation Act of 1973, P.L. 93-122 and other applicable federal regulations relating thereto and issued by the United States Department of Transportation.

In addition to the incorporation of requirement set forth above, Owner and Contractor hereby agree to incorporate into the Contract Documents, including all contracts with subcontractors, the provisions set forth in the “Required Contract Provisions Federal-Aid Construction Contracts” set forth on **Schedule I** attached hereto and fully incorporated herein (the “**Required Provisions Exhibit**”); provided, however, that Attachment A to the Required Provisions Exhibit is not applicable to the Project and shall be disregarded in its entirety.

4. Compliance with State Law. Owner and Contractor hereby agree that the terms of the Contract Documents as well as the completion of the Work and the conduct of the parties under such Contract Documents must be in accordance with all applicable statutes, regulations, directives, policies, guidelines, procedures, and other program or technical provisions issued by or governing KYTC and/or applicable to Federal-aid funded projects like the Project, including but not limited to the following:

A. Chapter 45A of the Kentucky Revised Statutes (“**KRS**”), including but not limited to the right of the KYTC, the Finance and Administration Cabinet, the Auditor of Public Accounts, and the Legislative Research Commission, or their duly authorized representatives, to have access to any of Contractor’s books, documents, papers, records, or other evidence which are directly pertinent to the Project, the Work or the Contract Documents;

B. KRS § 523.020 which requires Contractor to swear under penalty of perjury that neither Contractor nor its managers or members has knowingly violated any provisions of the campaign finance laws of the Commonwealth of Kentucky and an award of the Work under the Contract Documents to Contractor will not violate any provisions of the campaign finance laws of the Commonwealth of Kentucky;

C. KRS Chapter 136 in regard to the corporate and utility tax;

D. KRS Chapter 139 in regard to the state sales and use tax;

E. KRS Chapter 141 in regard to the income tax;

F. KRS Chapter 337 in regard to wages and hours laws;

G. KRS Chapter 338 in regard to occupational safety and health law;

H. KRS Chapter 341 in regard to unemployment compensation law;
and

I. KRS Chapter 342 in regard to workers compensation insurance
law.

5. Retainage. Owner and Contractor hereby covenant and agree that no retainage shall be withheld from payments to Contractor or any subcontractors in connection with the Project.

6. Demobilization. The demobilization amount (“**Demobilization**”) required by KYTC shall be equal to three percent (3%) of the Contract Sum. Upon Substantial Completion as certified by the Architect and approved by the Owner, one half of the Demobilization shall be released to Contractor. Upon final acceptance of the Work by Owner, including completion of all punch list items, the remaining one half of the Demobilization shall be released to Contractor.

7. Prohibited Payments. Owner and Contractor hereby covenant and agree that no funds have been or will be paid to a member of or delegate to the Congress of the United States in connection with the Work or the Contract Documents, nor shall any member of or delegate to the Congress of the United States receive any benefit arising out of the Contract Documents.

8. DBE Goals and Requirements for the Project. Owner and Contractor hereby agree that there shall be a goal of five percent (5%) of the total Contract Sum to be awarded to DBEs. In addition, Owner has determined and Contractor hereby agrees that neither Owner nor Contractor shall hold any retainage from any DBE subcontractors.

[Signatures on following page.]

IN WITNESS WHEREOF, the parties have executed this Second Addendum as
of the ___ day of _____, 2013.

OWNER:

21st CENTURY PARKS, INC.,
a Kentucky non-profit corporation

By: _____
Daniel H. Jones, President

CONTRACTOR:

_____,
a/an _____

By: _____

Name: _____

Title: _____

**THE PARKLANDS OF FLOYDS FORK – PROJECT 4A
THE STRAND, TURKEY RUN PARK & BROAD RUN PARK**

SECTION 00700

GENERAL CONDITIONS

DRAFT AIA® Document A201™ - 2007

General Conditions of the Contract for Construction

for the following PROJECT:

(Name and location or address)
Parklands of Floyds Fork – Project 4A
The Strand, Turkey Run Park & Broad Run Park
Louisville, Jefferson County, Kentucky

THE OWNER:

(Name, legal status and address)
21st Century Parks, Inc., a Kentucky non-profit corporation
Attn: Joe Daley
471 West Main Street
Suite 202
Louisville, Kentucky 40202

THE ARCHITECT:

(Name, legal status and address)
Wallace Roberts & Todd, LLC
1700 Market Street
28th Floor
Philadelphia, Pennsylvania 19103

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ADDITIONS AND DELETIONS:

The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

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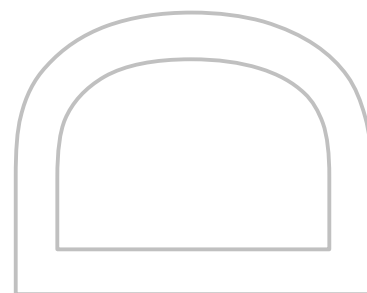
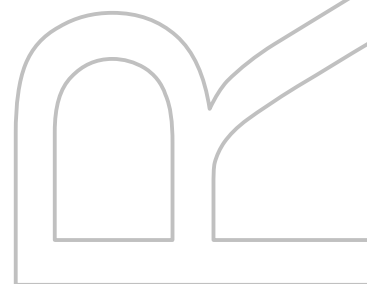
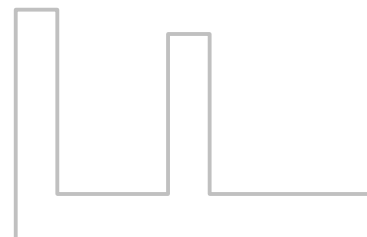
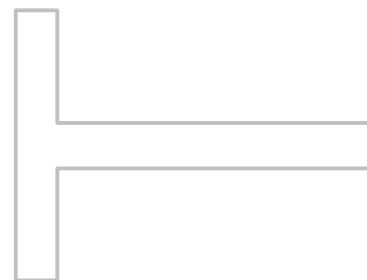
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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 BASIC DEFINITIONS

§ 1.1.1 THE CONTRACT DOCUMENTS

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding requirements.

§ 1.1.2 THE CONTRACT

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

§ 1.1.3 THE WORK

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 THE PROJECT

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by separate contractors.

§ 1.1.5 THE DRAWINGS

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules and diagrams.

§ 1.1.6 THE SPECIFICATIONS

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 INSTRUMENTS OF SERVICE

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 INITIAL DECISION MAKER

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2 and certify termination of the Agreement under Section 14.2.2.

§ 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.3 CAPITALIZATION

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 INTERPRETATION

In the interest of brevity the Contract Documents frequently omit modifying words such as “all” and “any” and articles such as “the” and “an,” but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS AND OTHER INSTRUMENTS OF SERVICE

§ 1.5.1 The Architect and the Architect’s consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and will retain all common law, statutory and other reserved rights, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as publication in derogation of the Architect’s or Architect’s consultants’ reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors and material or equipment suppliers are authorized to use and reproduce the Instruments of Service provided to them solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers may not use the Instruments of Service on other projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Architect and the Architect’s consultants.

§ 1.6 TRANSMISSION OF DATA IN DIGITAL FORM

If the parties intend to transmit Instruments of Service or any other information or documentation in digital form, they shall endeavor to establish necessary protocols governing such transmissions, unless otherwise already provided in the Agreement or the Contract Documents.

ARTICLE 2 OWNER

§ 2.1 GENERAL

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner’s approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term “Owner” means the Owner or the Owner’s authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of or enforce mechanic’s lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner’s interest therein.

§ 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

§ 2.2.1 Prior to commencement of the Work, the Contractor may request in writing that the Owner provide reasonable evidence that the Owner has made financial arrangements to fulfill the Owner’s obligations under the Contract. Thereafter, the Contractor may only request such evidence if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) a change in the Work materially changes the Contract Sum; or (3) the Contractor identifies in writing a reasonable concern regarding the Owner’s ability to make payment when due. The Owner shall furnish such evidence as a condition precedent to commencement or continuation of the Work or

the portion of the Work affected by a material change. After the Owner furnishes the evidence, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.2 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.2.3 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.2.4 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.2.5 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.3 OWNER'S RIGHT TO STOP THE WORK

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such deficiencies. In such case an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect or failure. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

ARTICLE 3 CONTRACTOR

§ 3.1 GENERAL

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.2.3, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall make Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely written notice to the Owner and Architect and shall not proceed with that portion of the Work without further written instructions from the Architect. If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Owner shall be solely responsible for any loss or damage arising solely from those Owner-required means, methods, techniques, sequences or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 LABOR AND MATERIALS

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other

facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Except in the case of minor changes in the Work authorized by the Architect in accordance with Sections 3.12.8 or 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.5 WARRANTY

The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.6 TAXES

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.7 PERMITS, FEES, NOTICES AND COMPLIANCE WITH LAWS

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 **Concealed or Unknown Conditions.** If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 21 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor in writing, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may proceed as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume

the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 ALLOWANCES

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

- .1 Allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- .2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- .3 Whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 SUPERINTENDENT

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the name and qualifications of a proposed superintendent. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to the proposed superintendent or (2) that the Architect requires additional time to review. Failure of the Architect to reply within the 14 day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall prepare and submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work.

§ 3.10.2 The Contractor shall prepare a submittal schedule, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, and shall submit the schedule(s) for the Architect's approval. The Architect's approval shall not unreasonably be delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

§ 3.11 DOCUMENTS AND SAMPLES AT THE SITE

The Contractor shall maintain at the site for the Owner one copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and one copy of approved Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Architect and shall be delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. Their purpose is to demonstrate the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve and submit to the Architect Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Architect in writing of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such written notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. The Contractor shall not be

required to provide professional services in violation of applicable law. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor all performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review, approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Contractor shall not be responsible for the adequacy of the performance and design criteria specified in the Contract Documents.

§ 3.13 USE OF SITE

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.14 CUTTING AND PATCHING

§ 3.14.1 The Contractor shall be responsible for cutting, fitting or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting and patching shall be restored to the condition existing prior to the cutting, fitting and patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or separate contractors by cutting, patching or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate contractor the Contractor's consent to cutting or otherwise altering the Work.

§ 3.15 CLEANING UP

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus materials from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 ACCESS TO WORK

The Contractor shall provide the Owner and Architect access to the Work in preparation and progress wherever located.

§ 3.17 ROYALTIES, PATENTS AND COPYRIGHTS

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for such defense or loss when a particular design, process or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications or other documents prepared by the Owner or Architect. However, if the Contractor has reason to believe that the required design, process or product is an infringement of a copyright or a patent, the Contractor shall be responsible for such loss unless such information is promptly furnished to the Architect.

§ 3.18 INDEMNIFICATION

§ 3.18.1 To the fullest extent permitted by law the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts.

ARTICLE 4 ARCHITECT

§ 4.1 GENERAL

§ 4.1.1 The Owner shall retain an architect lawfully licensed to practice architecture or an entity lawfully practicing architecture in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 4.1.2 Duties, responsibilities and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified or extended without written consent of the Owner, Contractor and Architect. Consent shall not be unreasonably withheld.

§ 4.1.3 If the employment of the Architect is terminated, the Owner shall employ a successor architect as to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 4.2 ADMINISTRATION OF THE CONTRACT

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, except as provided in Section 3.3.1.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and report to the Owner (1) known deviations from the Contract Documents and from the most recent construction schedule submitted by the Contractor, and (2) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of and will not be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 COMMUNICATIONS FACILITATING CONTRACT ADMINISTRATION

Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate with each other through the Architect about matters arising out of or relating to the Contract. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner.

§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.5.2 and 13.5.3, whether or not such Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5 and 3.12. The Architect's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Architect, of any construction means, methods, techniques, sequences or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may authorize minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more project representatives to assist in carrying out the Architect's responsibilities at the site. The duties, responsibilities and limitations of authority of such project representatives shall be as set forth in an exhibit to be incorporated in the Contract Documents.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 DEFINITIONS

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a separate contractor or subcontractors of a separate contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

§ 5.2.1 Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to any such proposed person or entity or (2) that the Architect requires additional time for review. Failure of the Owner or Architect to reply within the 14 day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person or entity previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.3 SUBCONTRACTUAL RELATIONS

By appropriate agreement, written where legally required for validity, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, which the Contractor, by these Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may

be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

- .1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor in writing; and
- .2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon such assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS

§ 6.1.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site under Conditions of the Contract identical or substantially similar to these including those portions related to insurance and waiver of subrogation. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such Claim as provided in Article 15.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each separate contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with other separate contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to the construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, separate contractors and the Owner until subsequently revised.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces, the Owner shall be deemed to be subject to the same obligations and to have the same rights that apply to the Contractor under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6 and Articles 10, 11 and 12.

§ 6.2 MUTUAL RESPONSIBILITY

§ 6.2.1 The Contractor shall afford the Owner and separate contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a separate contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Architect apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgment that

the Owner's or separate contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work, except as to defects not then reasonably discoverable.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a separate contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a separate contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or separate contractors as provided in Section 10.2.5.

§ 6.2.5 The Owner and each separate contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 OWNER'S RIGHT TO CLEAN UP

If a dispute arises among the Contractor, separate contractors and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 GENERAL

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor and Architect; a Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor; an order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents, and the Contractor shall proceed promptly, unless otherwise provided in the Change Order, Construction Change Directive or order for a minor change in the Work.

§ 7.2 CHANGE ORDERS

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor and Architect stating their agreement upon all of the following:

- .1 The change in the Work;
- .2 The amount of the adjustment, if any, in the Contract Sum; and
- .3 The extent of the adjustment, if any, in the Contract Time.

§ 7.3 CONSTRUCTION CHANGE DIRECTIVES

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

- .1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- .2 Unit prices stated in the Contract Documents or subsequently agreed upon;
- .3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or

.4 As provided in Section 7.3.7.

§ 7.3.4 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed in a proposed Change Order or Construction Change Directive so that application of such unit prices to quantities of Work proposed will cause substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 7.3.5 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.6 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.7 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the method and the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.7 shall be limited to the following:

- .1 Costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;
- .2 Costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;
- .3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
- .4 Costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work; and
- .5 Additional costs of supervision and field office personnel directly attributable to the change.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 MINOR CHANGES IN THE WORK

The Architect has authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes will be effected by written order signed by the Architect and shall be binding on the Owner and Contractor.

ARTICLE 8 TIME

§ 8.1 DEFINITIONS

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term “day” as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 PROGRESS AND COMPLETION

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by Article 11 to be furnished by the Contractor and Owner. The date of commencement of the Work shall not be changed by the effective date of such insurance.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 DELAYS AND EXTENSIONS OF TIME

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by an act or neglect of the Owner or Architect, or of an employee of either, or of a separate contractor employed by the Owner; or by changes ordered in the Work; or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the Contractor’s control; or by delay authorized by the Owner pending mediation and arbitration; or by other causes that the Architect determines may justify delay, then the Contract Time shall be extended by Change Order for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 CONTRACT SUM

The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.2 SCHEDULE OF VALUES

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit to the Architect, before the first Application for Payment, a schedule of values allocating the entire Contract Sum to the various portions of the Work and prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor’s Applications for Payment.

§ 9.3 APPLICATIONS FOR PAYMENT

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. Such application shall be notarized, if required, and supported by such data substantiating the Contractor’s right to payment as the Owner or Architect may require, such as copies of requisitions from Subcontractors and material suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or material supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage and transportation to the site for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or encumbrances in favor of the Contractor, Subcontractors, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials and equipment relating to the Work.

§ 9.4 CERTIFICATES FOR PAYMENT

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either issue to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the Contractor and Owner in writing of the Architect's reasons for withholding certification in whole or in part as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data comprising the Application for Payment, that, to the best of the Architect's knowledge, information and belief, the Work has progressed to the point indicated and that the quality of the Work is in accordance with the Contract Documents. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion and to specific qualifications expressed by the Architect. The issuance of a Certificate for Payment will further constitute a representation that the Contractor is entitled to payment in the amount certified. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work, (2) reviewed construction means, methods, techniques, sequences or procedures, (3) reviewed copies of requisitions received from Subcontractors and material suppliers and other data requested by the Owner to substantiate the Contractor's right to payment, or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 DECISIONS TO WITHHOLD CERTIFICATION

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- .1 defective Work not remedied;
- .2 third party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the Contractor;

- .3 failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;
- .4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- .5 damage to the Owner or a separate contractor;
- .6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay;
or
- .7 repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When the above reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.3 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or material or equipment suppliers to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Architect will reflect such payment on the next Certificate for Payment.

§ 9.6 PROGRESS PAYMENTS

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor no later than seven days after receipt of payment from the Owner the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and material and equipment suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay or to see to the payment of money to a Subcontractor, except as may otherwise be required by law.

§ 9.6.5 Contractor payments to material and equipment suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors and suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, shall create any fiduciary liability or tort liability on the part of the Contractor for breach of trust or shall entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.7 FAILURE OF PAYMENT

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' written notice to the Owner and Architect,

stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shut-down, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 SUBSTANTIAL COMPLETION

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in such Certificate. Upon such acceptance and consent of surety, if any, the Owner shall make payment of retainage applying to such Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 PARTIAL OCCUPANCY OR USE

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer as required under Section 11.3.1.5 and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 FINAL COMPLETION AND FINAL PAYMENT

§ 9.10.1 Upon receipt of the Contractor's written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection and, when the

Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment and (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

- .1 liens, Claims, security interests or encumbrances arising out of the Contract and unsettled;
- .2 failure of the Work to comply with the requirements of the Contract Documents; or
- .3 terms of special warranties required by the Contract Documents.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor or material supplier shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 SAFETY PRECAUTIONS AND PROGRAMS

The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 SAFETY OF PERSONS AND PROPERTY

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to

- .1 employees on the Work and other persons who may be affected thereby;
- .2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or the Contractor's Subcontractors or Sub-subcontractors; and
- .3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss.

§ 10.2.3 The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent sites and utilities.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3, except damage or loss attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 INJURY OR DAMAGE TO PERSON OR PROPERTY

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, written notice of such injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 HAZARDOUS MATERIALS

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to the Owner and Architect in writing.

§ 10.3.2 Upon receipt of the Contractor's written notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of such material or substance or who are to perform the task of removal or safe containment of such material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased in the amount of the Contractor's reasonable additional costs of shut-down, delay and start-up.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall indemnify the Owner for the cost and expense the Owner incurs (1) for remediation of a material or substance the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall indemnify the Contractor for all cost and expense thereby incurred.

§ 10.4 EMERGENCIES

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 CONTRACTOR'S LIABILITY INSURANCE

§ 11.1.1 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

- .1 Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed;
- .2 Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;
- .3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;
- .4 Claims for damages insured by usual personal injury liability coverage;
- .5 Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;
- .6 Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;
- .7 Claims for bodily injury or property damage arising out of completed operations; and
- .8 Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.

§ 11.1.2 The insurance required by Section 11.1.1 shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from the date of commencement of the Work until the date of final payment and termination of any coverage required to be maintained after final payment, and, with respect to the Contractor's completed operations coverage, until the expiration of the period for correction

of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents.

§ 11.1.3 Certificates of insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work and thereafter upon renewal or replacement of each required policy of insurance. These certificates and the insurance policies required by this Section 11.1 shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment as required by Section 9.10.2 and thereafter upon renewal or replacement of such coverage until the expiration of the time required by Section 11.1.2. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness.

§ 11.1.4 The Contractor shall cause the commercial liability coverage required by the Contract Documents to include (1) the Owner, the Architect and the Architect's consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations.

§ 11.2 OWNER'S LIABILITY INSURANCE

The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance.

§ 11.3 PROPERTY INSURANCE

§ 11.3.1 Unless otherwise provided, the Owner shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance written on a builder's risk "all-risk" or equivalent policy form in the amount of the initial Contract Sum, plus value of subsequent Contract Modifications and cost of materials supplied or installed by others, comprising total value for the entire Project at the site on a replacement cost basis without optional deductibles. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made as provided in Section 9.10 or until no person or entity other than the Owner has an insurable interest in the property required by this Section 11.3 to be covered, whichever is later. This insurance shall include interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Project.

§ 11.3.1.1 Property insurance shall be on an "all-risk" or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect's and Contractor's services and expenses required as a result of such insured loss.

§ 11.3.1.2 If the Owner does not intend to purchase such property insurance required by the Contract and with all of the coverages in the amount described above, the Owner shall so inform the Contractor in writing prior to commencement of the Work. The Contractor may then effect insurance that will protect the interests of the Contractor, Subcontractors and Sub-subcontractors in the Work, and by appropriate Change Order the cost thereof shall be charged to the Owner. If the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain insurance as described above, without so notifying the Contractor in writing, then the Owner shall bear all reasonable costs properly attributable thereto.

§ 11.3.1.3 If the property insurance requires deductibles, the Owner shall pay costs not covered because of such deductibles.

§ 11.3.1.4 This property insurance shall cover portions of the Work stored off the site, and also portions of the Work in transit.

§ 11.3.1.5 Partial occupancy or use in accordance with Section 9.9 shall not commence until the insurance company or companies providing property insurance have consented to such partial occupancy or use by endorsement or

otherwise. The Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

§ 11.3.2 BOILER AND MACHINERY INSURANCE

The Owner shall purchase and maintain boiler and machinery insurance required by the Contract Documents or by law, which shall specifically cover such insured objects during installation and until final acceptance by the Owner; this insurance shall include interests of the Owner, Contractor, Subcontractors and Sub-subcontractors in the Work, and the Owner and Contractor shall be named insureds.

§ 11.3.3 LOSS OF USE INSURANCE

The Owner, at the Owner's option, may purchase and maintain such insurance as will insure the Owner against loss of use of the Owner's property due to fire or other hazards, however caused. The Owner waives all rights of action against the Contractor for loss of use of the Owner's property, including consequential losses due to fire or other hazards however caused.

§ 11.3.4 If the Contractor requests in writing that insurance for risks other than those described herein or other special causes of loss be included in the property insurance policy, the Owner shall, if possible, include such insurance, and the cost thereof shall be charged to the Contractor by appropriate Change Order.

§ 11.3.5 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, the Owner shall waive all rights in accordance with the terms of Section 11.3.7 for damages caused by fire or other causes of loss covered by this separate property insurance. All separate policies shall provide this waiver of subrogation by endorsement or otherwise.

§ 11.3.6 Before an exposure to loss may occur, the Owner shall file with the Contractor a copy of each policy that includes insurance coverages required by this Section 11.3. Each policy shall contain all generally applicable conditions, definitions, exclusions and endorsements related to this Project. Each policy shall contain a provision that the policy will not be canceled or allowed to expire, and that its limits will not be reduced, until at least 30 days' prior written notice has been given to the Contractor.

§ 11.3.7 WAIVERS OF SUBROGATION

The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) the Architect, Architect's consultants, separate contractors described in Article 6, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other causes of loss to the extent covered by property insurance obtained pursuant to this Section 11.3 or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by the Owner as fiduciary. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors described in Article 6, if any, and the subcontractors, sub-subcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

§ 11.3.8 A loss insured under the Owner's property insurance shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.3.10. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner.

§ 11.3.9 If required in writing by a party in interest, the Owner as fiduciary shall, upon occurrence of an insured loss, give bond for proper performance of the Owner's duties. The cost of required bonds shall be charged against proceeds received as fiduciary. The Owner shall deposit in a separate account proceeds so received, which the

Owner shall distribute in accordance with such agreement as the parties in interest may reach, or as determined in accordance with the method of binding dispute resolution selected in the Agreement between the Owner and Contractor. If after such loss no other special agreement is made and unless the Owner terminates the Contract for convenience, replacement of damaged property shall be performed by the Contractor after notification of a Change in the Work in accordance with Article 7.

§ 11.3.10 The Owner as fiduciary shall have power to adjust and settle a loss with insurers unless one of the parties in interest shall object in writing within five days after occurrence of loss to the Owner's exercise of this power; if such objection is made, the dispute shall be resolved in the manner selected by the Owner and Contractor as the method of binding dispute resolution in the Agreement. If the Owner and Contractor have selected arbitration as the method of binding dispute resolution, the Owner as fiduciary shall make settlement with insurers or, in the case of a dispute over distribution of insurance proceeds, in accordance with the directions of the arbitrators.

§ 11.4 PERFORMANCE BOND AND PAYMENT BOND

§ 11.4.1 The Owner shall have the right to require the Contractor to furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder as stipulated in bidding requirements or specifically required in the Contract Documents on the date of execution of the Contract.

§ 11.4.2 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 UNCOVERING OF WORK

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be at the Owner's expense. If such Work is not in accordance with the Contract Documents, such costs and the cost of correction shall be at the Contractor's expense unless the condition was caused by the Owner or a separate contractor in which event the Owner shall be responsible for payment of such costs.

§ 12.2 CORRECTION OF WORK

§ 12.2.1 BEFORE OR AFTER SUBSTANTIAL COMPLETION

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, whether discovered before or after Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 AFTER SUBSTANTIAL COMPLETION

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.4.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction, whether completed or partially completed, of the Owner or separate contractors caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 ACCEPTANCE OF NONCONFORMING WORK

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 GOVERNING LAW

The Contract shall be governed by the law of the place where the Project is located except that, if the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.2 SUCCESSORS AND ASSIGNS

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns and legal representatives to covenants, agreements and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make such an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate such assignment.

§ 13.3 WRITTEN NOTICE

Written notice shall be deemed to have been duly served if delivered in person to the individual, to a member of the firm or entity, or to an officer of the corporation for which it was intended; or if delivered at, or sent by registered or certified mail or by courier service providing proof of delivery to, the last business address known to the party giving notice.

§ 13.4 RIGHTS AND REMEDIES

§ 13.4.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights and remedies otherwise imposed or available by law.

§ 13.4.2 No action or failure to act by the Owner, Architect or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach there under, except as may be specifically agreed in writing.

§ 13.5 TESTS AND INSPECTIONS

§ 13.5.1 Tests, inspections and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of (1) tests, inspections or approvals that do not become requirements until after bids are received or negotiations concluded, and (2) tests, inspections or approvals where building codes or applicable laws or regulations prohibit the Owner from delegating their cost to the Contractor.

§ 13.5.2 If the Architect, Owner or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection or approval not included under Section 13.5.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection or approval by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.5.3, shall be at the Owner's expense.

§ 13.5.3 If such procedures for testing, inspection or approval under Sections 13.5.1 and 13.5.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure including those of repeated procedures and compensation for the Architect's services and expenses shall be at the Contractor's expense.

§ 13.5.4 Required certificates of testing, inspection or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.5.5 If the Architect is to observe tests, inspections or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.5.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.6 INTEREST

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at such rate as the parties may agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

§ 13.7 TIME LIMITS ON CLAIMS

The Owner and Contractor shall commence all claims and causes of action, whether in contract, tort, breach of warranty or otherwise, against the other arising out of or related to the Contract in accordance with the requirements of the final dispute resolution method selected in the Agreement within the time period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all claims and causes of action not commenced in accordance with this Section 13.7.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 TERMINATION BY THE CONTRACTOR

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, for any of the following reasons:

- .1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- .2 An act of government, such as a declaration of national emergency that requires all Work to be stopped;

- .3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or
- .4 The Owner has failed to furnish to the Contractor promptly, upon the Contractor's request, reasonable evidence as required by Section 2.2.1.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, repeated suspensions, delays or interruptions of the entire Work by the Owner as described in Section 14.3 constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, including reasonable overhead and profit, costs incurred by reason of such termination, and damages.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing portions of the Work under contract with the Contractor because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' written notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 TERMINATION BY THE OWNER FOR CAUSE

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- .1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- .2 fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;
- .3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- .4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the above reasons exist, the Owner, upon certification by the Initial Decision Maker that sufficient cause exists to justify such action, may without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- .1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- .2 Accept assignment of subcontracts pursuant to Section 5.4; and
- .3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.3 SUSPENSION BY THE OWNER FOR CONVENIENCE

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay or interruption as described in Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

- .1 that performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is responsible; or
- .2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of written notice from the Owner of such termination for the Owner's convenience, the Contractor shall

- .1 cease operations as directed by the Owner in the notice;
- .2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
- .3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment for Work executed, and costs incurred by reason of such termination, along with reasonable overhead and profit on the Work not executed.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 CLAIMS

§ 15.1.1 DEFINITION

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim.

§ 15.1.2 NOTICE OF CLAIMS

Claims by either the Owner or Contractor must be initiated by written notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party must be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3 CONTINUING CONTRACT PERFORMANCE

Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents. The Architect will prepare Change Orders and issue Certificates for Payment in accordance with the decisions of the Initial Decision Maker.

§ 15.1.4 CLAIMS FOR ADDITIONAL COST

If the Contractor wishes to make a Claim for an increase in the Contract Sum, written notice as provided herein shall be given before proceeding to execute the Work. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.5 CLAIMS FOR ADDITIONAL TIME

§ 15.1.5.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, written notice as provided herein shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.5.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated and had an adverse effect on the scheduled construction.

§ 15.1.6 CLAIMS FOR CONSEQUENTIAL DAMAGES

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

- .1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and
- .2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.6 shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 INITIAL DECISION

§ 15.2.1 Claims, excluding those arising under Sections 10.3, 10.4, 11.3.9, and 11.3.10, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim arising prior to the date final payment is due, unless 30 days have passed after the Claim has been referred to the Initial Decision Maker with no decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of such request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of an initial decision, demand in writing that the other party file for mediation within 60 days of the initial decision. If such a demand is made and the party receiving the demand fails to file for mediation within the time required, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.3 MEDIATION

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.6 shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 ARBITRATION

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

§ 15.4.4 CONSOLIDATION OR JOINDER

§ 15.4.4.1 Either party, at its sole discretion, may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Either party, at its sole discretion, may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an

additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as the Owner and Contractor under this Agreement.



**THE PARKLANDS OF FLOYDS FORK – PROJECT 4A
THE STRAND, TURKEY RUN PARK & BROAD RUN PARK**

SECTION 00800

INFORMATION AVAILABLE TO BIDDERS

1.1 SUMMARY

- A. Document Includes:
1. Subsurface investigation report.
 2. Design Team ACAD Files

1.2 ACCESS TO DOCUMENTS

- A. A copy of the geotechnical reports and the design Team's ACAD files will be made available for all bidders. These documents will be made available through an FTP site provided by Wallace Roberts and Todd. The documents will be for information only. Since some of the base files use LOGIC, there will be a LOGIC request waiver that will need to be signed. There will also be a Qk4 release waiver that will need to be signed in order to make use of the digital civil and structural files for bidding. Please send an email request for the waivers to D. Jason Crowder (jcrowder@bravura-arch.com). Upon receipt of the LOGIC request waiver and Qk4 release waiver, Jason will email the waivers for signature. Upon receipt of the signed waivers, Jason will email an FTP link where the files can be downloaded.

1.3 SUBSURFACE INVESTIGATION REPORT

- A. A copy of a geotechnical reports for the structural grading/fill, structural foundations and floor slabs and pavements are available.
- B. This report identifies properties of below-grade conditions and offers recommendations for design of foundations, prepared primarily for use of Architect/Engineer.
- C. Recommendations described are not requirements of this Contract, unless specifically referenced in the Contract Documents.
- D. This report, by its nature, cannot reveal all conditions existing on the site. Should subsurface conditions be found to vary substantially from this report, changes in design and construction of foundations will be made, with resulting credits or expenditures to Contract Price/Sum accruing to Owner.

THE PARKLANDS OF FLOYDS FORK – PROJECT 4A THE STRAND, TURKEY RUN PARK & BROAD RUN PARK

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Work covered by the Contract Documents.
 - 2. Type of the Contract.
 - 3. Work under other contracts.
 - 4. Use of premises.
 - 5. Specification formats and conventions.

- B. Related Sections include Division 01 Section "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

- A. Project Identification: The Parklands at Floyds Fork – Project 4A, The Strand, Turkey Run Park & Broad Run Park.
 - 1. Project Location: 15712 Shelbyville Rd, Louisville, Kentucky 40245.

- B. Owner: 21st Century Parks, Inc..
 - 1. Owner's Representative: Joseph Daley, 471 W. Main Street, Suite 202, Louisville, KY 40202.

- C. Architect & Engineer:
 - 1. Prime: Wallace Roberts & Todd, LLC., 1700 Market St., 28th Floor, Philadelphia, PA 19103.
 - 2. Local Architect: Bravura Corporation, 111 W. Washington Street, Suite 200, Louisville KY 40202.
 - 3. Local Engineer: Qk4, 1046 East Chestnut Street, Louisville, KY 40204.

- D. The Work consists of the following:

THE PARKLANDS OF FLOYDS FORK – PROJECT 4A THE STRAND, TURKEY RUN PARK & BROAD RUN PARK

1. Components of the site design include: demolition; general grading; dry laid stone headwalls and endwalls; asphalt paving; culverts; con-spans, retaining walls; concrete paving; seeding; site electrical; guardrails; gates; site furniture foundations; fences and bollards.

Components of the bridges include: cast-in-place concrete for slab, barriers, diaphragms, abutment, end bent, wingwalls, approach slab, and 6" slopewall, plain and epoxy coated reinforcement, stainless steel railing, haunched weathering steel plate girders, steel h-piles, variegated stone blocks for landscaping and erosion control, roughback and smooth finish variegated stone blocks for abutment facing, structure granular backfill, and gabion walls.

Components of the catenary bridge include: PT strand rock anchors with multiple-stage grouting, reinforced concrete cable anchorages, galvanized structural strand cables with open spelter sockets, built-up steel plate cable saddles, built-up steel plate cable bents (armatures), rolled structural steel miscellaneous channels and wide flanges, ipe (lapacho subspecies) hardwood decking, 3x1/16 elastomeric pad damping strips, Esco twitch slide handrail cable chokers, wire rope hangers with ferrules each end, and annealed or painted 9-gage, 2" x 2" cyclone mesh.

Components of the bioengineering around the bridges include: boulder toe, branch layering, live staking, joint plantings (rip rap and soil mixture), variegated limestone rock, erosion control matting, native seed, and native tree and shrub plantings.

Components of the trailhead include: cast in place board-formed concrete; pre-cast concrete; glulam columns and beams; wood siding; general carpentry; windows; metal roofing; site furnishing foundations, plumbing and lighting.

Coordination with 4B:

The contractor for the 4A project will have to coordinate their work with the 4B general contractor that will be selected after the 4A contractor is under contract. Project 4B is the development of the private pay portion of work for the The Strand, Turkey Run Park & Broad Run Park. The work may include the development of the Silo Center, Cliffside Center, hike/bike trails and plantings.

1.4 TYPE OF CONTRACT

- A. Project will be constructed under a single prime contract.

THE PARKLANDS OF FLOYDS FORK – PROJECT 4A THE STRAND, TURKEY RUN PARK & BROAD RUN PARK

1.5 WORK UNDER OTHER CONTRACTS

- A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract. Coordinate the Work of this Contract with work performed under separate contracts.

1.6 USE OF PREMISES

- A. General: Each Contractor shall have full use of premises for construction operations, including use of Project site, during construction period. Each Contractor's use of premises is limited only by Owner's right to perform work or to retain other contractors on portions of Project.
- B. Use of Site: Limit use of premises to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1.7 SPECIFICATION FORMATS AND CONVENTIONS

- A. Specification Format: The Specifications are organized into Divisions and Sections using the 50-division format and CSI/CSC's "MasterFormat" numbering system.
 - 1. Section Identification: The Specifications use Section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete because all available Section numbers are not used. Consult the table of contents at the beginning of the Project Manual to determine numbers and names of Sections in the Contract Documents.
 - 2. Division 01: Sections in Division 01 govern the execution of the Work of all Sections in the Specifications.
- B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 - 1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.
 - 2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.
 - a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

**THE PARKLANDS OF FLOYDS FORK – PROJECT 4A
THE STRAND, TURKEY RUN PARK & BROAD RUN PARK**

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

**THE PARKLANDS OF FLOYDS FORK – PROJECT 4A
THE STRAND, TURKEY RUN PARK & BROAD RUN PARK**

SECTION 012200 - UNIT PRICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for unit prices.
- B. Related Sections include the following:
 - 1. Division 01 Section "Contract Modification Procedures" for procedures for submitting and handling Change Orders.

1.3 DEFINITIONS

- A. Unit price is an amount proposed by bidders and approved by the Owner, as a price per unit of measurement for materials or services added to or deducted from the Contract Sum as requested and approved by the Owner.

1.4 PROCEDURES

- A. Unit prices include all necessary material, cost for delivery, installation, insurance, applicable taxes, overhead, and profit.
- B. List of Unit Prices: A list of unit prices is included in the Bid Form. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.
- C. Measurement and Payment for Change Orders only: Refer to individual Specification Sections for establishment of unit prices.
- D. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor.

1.5 UNIT PRICE LIST

**THE PARKLANDS OF FLOYDS FORK – PROJECT 4A
THE STRAND, TURKEY RUN PARK & BROAD RUN PARK**

- A. The following Unit Price List is for reference only and is not to be submitted with the Bid Form. The awarded contractor will be required to submit the completed final Unit Price List to the Owner for review and concurrence prior to proceeding as stated in the contract agreements.

| <u>ITEM</u> | <u>UNIT OF MEASURE</u> | <u>UNIT PRICE</u> |
|--|------------------------|-------------------|
| <u>SITE WORK</u> | | |
| Minor Excavation (Earth) < 50 Cu. Yd | Per Cu. Yd. | _____ |
| Major Excavation (Earth) > 50 Cu. Yd | Per Cu. Yd. | _____ |
| Minor Excavation (Trench) | Per Cu. Yd. | _____ |
| (Remove unsuitable soil & replace w/ compacted acceptable soils/engineered fill) | | |
| Backfill & Compaction (Material from site) | Per Cu. Yd. | _____ |
| Borrow (Hauled in & compacted & graded) | Per Cu. Yd. | _____ |
| DGA (In place and compacted) | Per Cu. Yd | _____ |
| Embankment (Placed, compacted & graded) | Per Cu. Yd. | _____ |
| Park Road Asphalt Pavement, complete | Per Sq. Yd. | _____ |
| Louisville Loop Concrete Pvmt, complete | Per Sq. Yd. | _____ |
| Louisville Loop Asphalt Pavement, complete | Per Sq. Yd. | _____ |
| Parking Asphalt Pavement, complete | Per Sq. Yd. | _____ |
| Park Road Asphalt Base | Per Ton | _____ |
| Park Road Asphalt Surface | Per Ton | _____ |
| Lime\Cement (6%) Stabilized Roadbed Complete | Per Sq. Yd. | _____ |
| 4" Concrete Sidewalk, complete | Per Sq. Yd. | _____ |
| 6" Concrete Pavement, Installed | Per Sq. Yd. | _____ |
| 10" Concrete Pavement, Installed | Per Sq. Yd. | _____ |
| Silicone Joint Sealing-Concrete | Per Lin. Ft. | _____ |
| Mill 1 1/2" & Install Asphalt Surface | Per Sq. Yd. | _____ |
| 6" Header Curb | Per Lin. Ft. | _____ |
| 6" Integral Curb | Per Lin. Ft. | _____ |
| Weathering Steel "W" Guardrail, Installed | Per Lin. Ft. | _____ |
| Galvanized Steel "W" Guardrail, Installed | Per Lin. Ft. | _____ |
| Galvanized Guardrail Term Sect. No. 1 | Ea | _____ |
| Weathering Steel Guardrail Term Sect No. 1 | Ea | _____ |
| Guardrail End Treatment Type 4A | Ea | _____ |
| Guardrail End Treatment Type 4A-Painted | Ea | _____ |
| 3" Water Service Water Line | Per Lin. Ft. | _____ |
| 1-1/2" Water Service Water Line | Per Lin. Ft. | _____ |

THE PARKLANDS OF FLOYDS FORK – PROJECT 4A
THE STRAND, TURKEY RUN PARK & BROAD RUN PARK

| | | |
|--------------------------------------|--------------|-------|
| 1" Water Service Water Line | Per Lin. Ft. | _____ |
| 3" Water Line Valve | Each | _____ |
| Yard Hydrant | Each | _____ |
| Ejector Pump | Each | _____ |
| 1500 gallon Septic Storage Tank | Each | _____ |
| 2000 gallon Septic tank | Each | _____ |
| Distribution Box | Each | _____ |
| Lateral, complete | Per Lin. Ft. | _____ |
| 4" Dia. Schedule 40 PVC Drain Line | Per Lin. Ft. | _____ |
| 12" RCP (In place & backfilled) | Per Lin. Ft. | _____ |
| 15" RCP (In place & backfilled) | Per Lin. Ft. | _____ |
| 18" RCP (In place & backfilled) | Per Lin. Ft. | _____ |
| 24" RCP (In place & backfilled) | Per Lin. Ft. | _____ |
| 30" RCP (In place & backfilled) | Per Lin. Ft. | _____ |
| 36" RCP (In place & backfilled) | Per Lin. Ft. | _____ |
| 42" RCP (In place & backfilled) | Per Lin. Ft. | _____ |
| 48" RCP (in place & backfilled) | Per Lin. Ft. | _____ |
| 54" RCP (In place & backfilled) | Per Lin. Ft. | _____ |
| 60" RCP (In place & backfilled) | Per Lin. Ft. | _____ |
| 23"x14" RCEP (In place & backfilled) | Per Lin. Ft. | _____ |
| 30"x19" RCEP (In place & backfilled) | Per Lin. Ft. | _____ |
| 38"x24" RCEP (In place & backfilled) | Per Lin. Ft. | _____ |
| 45"x29" RCEP (In place & backfilled) | Per Lin. Ft. | _____ |
| 53"x34" RCEP (In place & backfilled) | Per Lin. Ft. | _____ |
| 60"x38" RCEP (In place & backfilled) | Per Lin. Ft. | _____ |
| 68"x43" RCEP (In place & backfilled) | Per Lin. Ft. | _____ |
| 12" Dry Laid Creekstone Headwall | Each | _____ |
| 15" Dry Laid Creekstone Headwall | Each | _____ |
| 18" Dry Laid Creekstone Headwall | Each | _____ |
| 24" Dry Laid Creekstone Headwall | Each | _____ |
| 30" Dry Laid Creekstone Headwall | Each | _____ |
| 36" Dry Laid Creekstone Headwall | Each | _____ |
| 42" Dry Laid Creekstone Headwall | Each | _____ |
| 48" Dry Laid Creekstone Headwall | Each | _____ |
| 54" Dry Laid Creekstone Headwall | Each | _____ |
| 60" Dry Laid Creekstone Headwall | Each | _____ |

UNIT PRICES

012200-3

**THE PARKLANDS OF FLOYDS FORK – PROJECT 4A
THE STRAND, TURKEY RUN PARK & BROAD RUN PARK**

| | | |
|--|--------------|-------|
| 23"x14" Dry Laid Creekstone Headwall | Each | _____ |
| 30"x19" Dry Laid Creekstone Headwall | Each | _____ |
| 38"x24" Dry Laid Creekstone Headwall | Each | _____ |
| 45"x29" Dry Laid Creekstone Headwall | Each | _____ |
| 53"x34" Dry Laid Creekstone Headwall | Each | _____ |
| 60"x38" Dry Laid Creekstone Headwall | Each | _____ |
| 68"x43" Dry Laid Creekstone Headwall | Each | _____ |
| 30"x12" Trench Drain (CIP with grate) | Lin. Ft. | _____ |
| Bumper Block (Installed) | Each | _____ |
| Erosion Control Blanket | Per Sq. Yd. | _____ |
| Silt Fencing | Per Lin. Ft. | _____ |
| Reinforced Silt Fencing | Per Lin. Ft. | _____ |
| Stone Bag Inlet Protection | Each | _____ |
| Winged Headwall Inlet Protection | Each | _____ |
| Straight Headwall Inlet Protection | Each | _____ |
| Stone Bag Check Dam in Small Ditch | Each | _____ |
| Rock Ditch Check | Each | _____ |
| Stabilized Construction Entrance | Per Sq. Yd. | _____ |
| Tree Protection Fencing | Per Lin. Ft. | _____ |
| 30"x12" Headwall - MSD DH-01-01 (Modified) | Each | _____ |
| Rock Fence (42") | Per Lin. Ft. | _____ |
| Concrete Seat Walls | Per Lin. Ft. | _____ |
| Temporary Seeding | Per Acre | _____ |
| Mown Lawn Seed | Per Acre | _____ |
| Mown Lawn Seed | Per Sq. Ft | _____ |
| Wildflower Meadow Seed Mix - Wet | Per Acre | _____ |
| Wildflower Meadow Seed Mix - Dry | Per Acre | _____ |

RETAINING WALLS

| | | |
|--------------------------------------|----------|-------|
| Structure Granular Backfill | Cu. Yd. | _____ |
| Fabric – Geotextile, Type I | Sq. Yd. | _____ |
| Retaining Wall – Segmental | Sq. Yd. | _____ |
| Retaining Wall Erection – Segmental | Sq. Yd. | _____ |
| Retaining Wall- Allen Block Complete | Sq. Yd. | _____ |
| Retaining Wall- Redi-Rock Complete | Sq Yd | _____ |
| Leveling Pad, Crushed Aggregate | Lin. Ft. | _____ |

UNIT PRICES

012200-4

**THE PARKLANDS OF FLOYDS FORK – PROJECT 4A
THE STRAND, TURKEY RUN PARK & BROAD RUN PARK**

| | | |
|------------------------------|---------|-------|
| Structure Excavation, Common | Cu. Yd. | _____ |
| Structure Excavation, Rock | Cu. Yd. | _____ |

BRIDGES F-401 – F411 (less F-407)

| | | |
|---------------------------------------|----------|-------|
| Structure Granular Backfill | Cu. Yd. | _____ |
| Channel Lining Class IA | Ton | _____ |
| Fabric – Geotextile, Type I | Sq. Yd. | _____ |
| Retaining Wall – Gabion | Cu. Yd. | _____ |
| Masonry Coating | Sq. Yd. | _____ |
| Structure Excavation, Common | Cu. Yd. | _____ |
| Structure Excavation, Rock | Cu. Yd. | _____ |
| Cofferdam | Lump Sum | _____ |
| 6” Reinforced Concrete Slopewall | Sq. Yd. | _____ |
| Cyclopean Stone Riprap | Ton | _____ |
| Test Pile | Lin. Ft. | _____ |
| Pre-Drilling for Piles | Lin. Ft. | _____ |
| Piles-Steel HP12x53 | Lin. Ft. | _____ |
| Piles-Steel HP14x73 | Lin. Ft. | _____ |
| Pile Points, 12” | Each | _____ |
| Pile Points, 14” | Each | _____ |
| Concrete Class “A” | Cu. Yd. | _____ |
| Concrete Class “AA” | Cu. Yd. | _____ |
| Steel Reinforcement | Lbs. | _____ |
| Steel Reinforcement, Epoxy Coated | Lbs. | _____ |
| Structural Steel (Lbs given in plans) | Lump Sum | _____ |
| Shear Connectors (Lbs given in plans) | Lump Sum | _____ |
| Armored Edge | Lin. Ft. | _____ |
| Approach Slab | Sq. Yd. | _____ |
| Stainless Steel Railing | Lin. Ft. | _____ |
| Variegated Limestone Blocks | Ton | _____ |
| Roughback Finish Limestone Blocks | Ton | _____ |
| Smooth Finish Limestone Blocks | Ton | _____ |
| Cold Fluid-Applied Waterproofing | Sq. Yd. | _____ |
| Pre Engineered Pedestrian Bridge | Each | _____ |

Bridge F-407 (CATENARY BRIDGE)

**THE PARKLANDS OF FLOYDS FORK – PROJECT 4A
THE STRAND, TURKEY RUN PARK & BROAD RUN PARK**

| | | |
|--|----------|-------|
| Structure Excavation, Common | Cu. Yd. | _____ |
| Structure Excavation, Rock | Cu. Yd. | _____ |
| Rock Probes, over 3-foot depth | Lin. Ft. | _____ |
| Karstic Formation Clay Seam Removal | Lin. Ft. | _____ |
| Karstic Formation Void Grouting | Lin. Ft. | _____ |
| Furnish and Install Rock Anchors | Lin. Ft. | _____ |
| Rock Anchor Load Test | Cu. Yd. | _____ |
| Structure Concrete, f'c = 4 ksi | Cu. Yd. | _____ |
| Concrete reinforcing, fy = 60 ksi | Lbs. | _____ |
| Concrete reinforcing, fy = 40 ksi | Lbs. | _____ |
| ABS drain pipe, 4" | Lin. Ft. | _____ |
| Structure Granular Backfill | Cu. Yd. | _____ |
| Fabric – Geotextile, Type I | Sq. Yd. | _____ |
| Minor Excavation (Trench) | Cu. Yd. | _____ |
| (Remove unsuitable soil & replace w/ compacted acceptable soils/engineered fill) | | |
| Backfill & Compaction (Material from site) | Cu. Yd. | _____ |
| Borrow (Hauled in & compacted & graded) | Cu. Yd. | _____ |
| 4" Concrete Sidewalk, complete | Sq. Yd. | _____ |
| 4" Dia. Schedule 40 PVC Drain Line | Lin. Ft. | _____ |
| Erosion Control Blanket | Sq. Yd. | _____ |
| Silt Fencing | Lin. Ft. | _____ |
| Reinforced Silt Fencing | Lin. Ft. | _____ |
| Tree Protection Fencing | Lin. Ft. | _____ |
| Structural Steel, Galvanized, A36 | Lbs. | _____ |
| Structural Strand, Class A coating, 5" | Lin. Ft. | _____ |
| Structural Strand, Class A coating, 1-1/4" | Lin. Ft. | _____ |
| Wire Rope, Class A coating, 1/2" | Lin. Ft. | _____ |
| (^^^ Includes, spelter sockets, pins, ferrules and prestretching ^^) | | |
| Elastomeric strips, deck, 3" x 1/16 | Lin. Ft. | _____ |
| Elastomeric pads, saddles and clamps | Sq. Ft. | _____ |
| Cyclone Mesh, galvanized | Lin. Ft. | _____ |
| 2x8 IPE (LAPACHO) Wood Decking | Lin. Ft. | _____ |
| Carriage Bolts, Galvanized, 1/2" | Per 100 | _____ |
| ASTM A490X bolts, Galvanized, 7/8" | Per 100 | _____ |
| ASTM A490X bolts, Galvanized, 3/4" | Per 100 | _____ |
| ASTM A325X bolts, Galvanized, 3/4" | Per 100 | _____ |

UNIT PRICES

012200-6

**THE PARKLANDS OF FLOYDS FORK – PROJECT 4A
THE STRAND, TURKEY RUN PARK & BROAD RUN PARK**

| | | |
|------------------------------------|---------|-------|
| ASTM A325X bolts, Galvanized, 5/8" | Per 100 | _____ |
|------------------------------------|---------|-------|

BIOENGINEERING AT THE BRIDGES

| | | |
|--|--------------|-------|
| Coir Matting | Sq. Yd. | _____ |
| Live Branch Layering | Per Lin. Ft. | _____ |
| Live Staking | Per Lin. Ft. | _____ |
| Rock Toe | Per Lin. Ft. | _____ |
| Soil / Riprap | CY | _____ |
| Geotextile Fabric, Type 1 | SY | _____ |
| Native Seed | Lbs. | _____ |
| Joint Plantings (1-gallon) | Each | _____ |
| Shrubs (1 to 3-gallon) | Each | _____ |
| Midstory Trees (1.5 to 2.0-inch caliper) | Each | _____ |
| Canopy Trees (2.5 to 3.0-inch caliper) | Each | _____ |
| Mown Lawn Sod | Per Sq. Ft. | _____ |
| Variegated Limestone Rock | Per Ton | _____ |
| Class II Channel Lining | Per Ton | _____ |

ELECTRICAL

| | | |
|--|--------------|-------|
| 4" PVC Conduit in trench with DGA backfill, Installed | Per Lin. Ft. | _____ |
| Type OL1 with concrete base, Installed | Each | _____ |
| Three (3) #3/0, 1 #4 ground in 2-1/2" schedule 40 pvc concrete encased conduits (schedule #80 pvc where exposed and for ells) with one additional empty 2-1/2" spare conduit. Minimum bury at 36". | Per Lin. Ft. | _____ |
| One (1) 1-1/2" schedule 80 pvc conduit. Minimum bury at 36" | Per Lin. Ft. | _____ |

ARCHITECTURE

| | | |
|-----------------------------------|--------------|-------|
| 4000 psi Concrete | Per Cu. Yard | _____ |
| Structural Steel | Per lb. | _____ |
| Reinforcing Steel | Per lb. | _____ |
| Concrete forms, including removal | Per Sq. Ft. | _____ |
| Board-formed concrete finish | Per Lin. Ft. | _____ |

UNIT PRICES

012200-7

**THE PARKLANDS OF FLOYDS FORK – PROJECT 4A
THE STRAND, TURKEY RUN PARK & BROAD RUN PARK**

| | | |
|---|-------------|-------|
| Colored Concrete | Per Cu. Ft. | _____ |
| Sheet Metal Roof, Flashing & Trim | Per Sq. Ft. | _____ |
| Field Applied Wood Stain, one coat | Per Sq. Ft. | _____ |
| High Performance Coatings | Per Sq. Ft. | _____ |
| Wood Siding | Per Sq. Ft. | _____ |
| Glulam Package – 2-Hole Trailhead | Each | _____ |
| Glulam Package – 4-Hole Trailhead | Each | _____ |
| Glulam Package – Kiosk | Each | _____ |
| Windows | Each | _____ |
| Hollow Metal Door & Hardware | Each | _____ |
| Trailhead Sign Package - 2-Hole Trailhead | Each | _____ |
| Trailhead Sign Package - 4-Hole Trailhead | Each | _____ |
| Toilet Room Accessory Package- 2-Hole Trailhead | Each | _____ |
| Toilet Room Accessory Package- 4-Hole Trailhead | Each | _____ |
| Light Fixture Package- 2-Hole Trailhead | Each | _____ |
| Light Fixture Package- 4-Hole Trailhead | Each | _____ |
| Plumbing Fixture Package- 2-Hole Trailhead | Each | _____ |
| Plumbing Fixture Package- 4-Hole Trailhead | Each | _____ |
| Mechanical Package- 2-Hole Trailhead | Each | _____ |
| Mechanical Package- 4-Hole Trailhead | Each | _____ |

ADD-ALTERNATE NO. 1: THE STRAND 2-HOLE TRAILHEAD, PLAZA, SITE WALLS, PARKING LOT LIGHTING, AND PARKING LOT

| | | |
|------------------------------------|--------------|-------|
| Rock Fence | Per Lin. Ft. | _____ |
| Concrete Seat Walls | Per Lin. Ft. | _____ |
| 4000 psi Concrete | Per Cu. Yard | _____ |
| Structural Steel | Per lb. | _____ |
| Reinforcing Steel | Per lb. | _____ |
| Concrete forms, including removal | Per Sq. Ft. | _____ |
| Board-formed concrete finish | Per Lin. Ft. | _____ |
| Colored Concrete | Per Cu. Ft. | _____ |
| Sheet Metal Roof, Flashing & Trim | Per Sq. Ft. | _____ |
| Field Applied Wood Stain, one coat | Per Sq. Ft. | _____ |
| High Performance Coatings | Per Sq. Ft. | _____ |
| Wood Siding | Per Sq. Ft. | _____ |
| Glulam Package – 2-Hole Trailhead | Each | _____ |

UNIT PRICES

012200-8

**THE PARKLANDS OF FLOYDS FORK – PROJECT 4A
THE STRAND, TURKEY RUN PARK & BROAD RUN PARK**

| | | |
|--|--------------|-------|
| Windows | Each | _____ |
| Hollow Metal Door & Hardware | Each | _____ |
| Trailhead Sign Package - 2-Hole Trailhead | Each | _____ |
| Toilet Room Accessory Package- 2-Hole Trailhead | Each | _____ |
| Light Fixture Package- 2-Hole Trailhead | Each | _____ |
| Plumbing Fixture Package- 2-Hole Trailhead | Each | _____ |
| Mechanical Package- 2-Hole Trailhead | Each | _____ |
| Minor Excavation (Trench) | Per Cu. Yd. | _____ |
| (Remove unsuitable soil & replace w/ compacted acceptable soils/engineered fill) | | |
| Backfill & Compaction (Material from site) | Per Cu. Yd. | _____ |
| Borrow (Hauled in & compacted & graded) | Per Cu. Yd. | _____ |
| DGA (In place and compacted) | Per Cu. Yd. | _____ |
| Parking Asphalt Pavement, complete | Per Sq. Yd. | _____ |
| 4" Concrete Sidewalk, complete | Per Sq. Yd. | _____ |
| 6" Header Curb | Per Lin. Ft. | _____ |
| 6" Integral Curb | Per Lin. Ft. | _____ |
| 3" Water Service Water Line | Per Lin. Ft. | _____ |
| 1-1/2" Water Service Water Line | Per Lin. Ft. | _____ |
| 1500 gallon Septic Storage Tank | Each | _____ |
| 2000 gallon Septic tank | Each | _____ |
| Distribution Box | Each | _____ |
| Lateral, complete | Per Lin. Ft. | _____ |
| 4" Dia. Schedule 40 PVC Drain Line | Per Lin. Ft. | _____ |
| 38"x24" RCEP (In place & backfilled) | Per Lin. Ft. | _____ |
| 24" Dry Laid Creekstone Headwall | Each | _____ |
| Bumper Block (Installed) | Each | _____ |
| Erosion Control Blanket | Per Sq. Yd. | _____ |
| Silt Fencing | Per Lin. Ft. | _____ |
| Stone Bag Inlet Protection | Each | _____ |
| Reinforced Silt Fencing | Per Lin. Ft. | _____ |
| Winged Headwall Inlet Protection | Each | _____ |
| Stone Bag Check Dam in Small Ditch | Each | _____ |
| Tree Protection Fencing | Per Lin. Ft. | _____ |
| Mown Lawn Seed | Per Acre | _____ |
| Wildflower Meadow Seed Mix - Wet | Per Acre | _____ |
| Minor Excavation (Earth) < 50 Cu. Yd | Per Cu. Yd. | _____ |

UNIT PRICES

012200-9

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| | | |
|---|--------------|-------|
| Wildflower Meadow Seed Mix - Dry | Per Acre | _____ |
| 4" PVC Conduit in trench with DGA backfill, Installed | Per Lin. Ft. | _____ |
| Type OL1 with concrete base, Installed | Each | _____ |
| Three (3) #3/0, 1 #4 ground in 2-1/2" schedule 40 pvc concrete encased conduits (schedule #80 pvc where exposed and for ells) with one additional empty 2-1/2" spare conduit. Minimum bury at 36". | Per Lin. Ft. | _____ |
| One (1) 1-1/2" schedule 80 pvc conduit. Minimum bury at 36" | Per Lin. Ft. | _____ |

ADD-ALTERNATE NO. 2: GALVANIZED FINISH ON METAL PIPE AND TUBE RAILINGS

| | | |
|-------------------|----------|-------|
| Galvanized Finish | Lump Sum | _____ |
|-------------------|----------|-------|

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012200

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SECTION 012300 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
 - 1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
 - 2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

- A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
 - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated revisions to alternates.
- C. Execute accepted alternates under the same conditions as other work of the Contract.

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- D. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

- A. Add-Alternate No. 1: The Strand 2-Hole Trailhead, Plaza, Site Walls, Parking Lot Lighting, and Parking Lot: Construct building as shown on drawings. Include all necessary structural, electrical, plumbing and mechanical systems, carpentry, hardware, etc. for complete building as designed.
1. Refer to Drawing Sheets: ST-C2.3, ST-C3.3, ST-C5.1, ST-C6.1, ST-C7.1, ST-C7.3, ST-C7.4, ST-C7.5, ST-C8.1, ST-C8.2, C9.1, C9.2, RS-C21, RS-C3, SP1-101, S1-001, S1-101, S1-201, S1-301, A1-101, A1-201, A1-301, A1-302, A1-303, A1-401, P1-101, M1-100, E1-001, E1-101, E1-102, A7-301.
 2. Refer to Specification Sections: 014110, 033000, 044301, 047200, 061063, 061600, 061801, 062013, 071900, 072100, 076100, 076200, 079200, 081113, 085201, 087100, 088000, 099113, 099300, 099600, 102800, 200100, 200200, 200300, 200500, 201100, 201300, 202100, 202200, 202300, 202400, 202500, 203100, 220100, 220200, 230200, 231100, 231200, 260501, 260502, 260503, 260504, 260508, 260510, 260519, 260526, 260531, 260533, 260544, 260553, 262400, 262726, 264313, 265113, 311000, 312000, 321216, 321313, 321373, 321723, 329210, 331100, 334100.

END OF SECTION 012300

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SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Sections:
 - 1. Division 01 Section "Allowances" for products selected under an allowance.
 - 2. Division 01 Section "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.
 - 3. Divisions 02 through 49 Sections for specific requirements and limitations for substitutions.

1.3 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
 - 1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
 - 2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 SUBMITTALS

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Substitution Request Form: Use CSI Form 13.1A.
 - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

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- a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
 - b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable specification section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
 - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. Certificates and qualification data, where applicable or requested.
 - g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
 - h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
 - j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
 - k. Cost information, including a proposal of change, if any, in the Contract Sum.
 - l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
 - m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
- a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
 - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

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1.5 QUALITY ASSURANCE

- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

- A. Coordination: Modify or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately upon discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.

- 1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - b. Substitution request is fully documented and properly submitted.
 - c. Requested substitution will not adversely affect Contractor's construction schedule.
 - d. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - e. Requested substitution is compatible with other portions of the Work.
 - f. Requested substitution has been coordinated with other portions of the Work.
 - g. Requested substitution provides specified warranty.
 - h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

- B. Substitutions for Convenience: Not allowed.

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

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SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.
- B. Related Sections include the following:
 - 1. Division 01 Section "Allowances" for procedural requirements for handling and processing allowances.
 - 2. Division 01 Section "Unit Prices" for administrative requirements for using unit prices.
 - 3. Division 01 Section "Product Requirements" for administrative procedures for handling requests for substitutions made after Contract award.

1.3 MINOR CHANGES IN THE WORK

- A. Architect will issue supplemental instructions authorizing Minor Changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Architect's Supplemental Instructions."

1.4 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
 - 1. Proposal Requests issued by Architect are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
 - 2. Within 10 days after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.

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- b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include costs of labor and supervision directly attributable to the change.
- B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by submitting a request for a change to Architect.
 - 1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
 - 2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - 3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - 4. Include costs of labor and supervision directly attributable to the change.
 - 5. Comply with requirements in Division 01 Section "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.
- C. Proposal Request Form: Use AIA Document G709 for Proposal Requests.

1.5 ALLOWANCES

- A. Allowance Adjustment: To adjust allowance amounts, base each Change Order proposal on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
 - 1. Include installation costs in purchase amount only where indicated as part of the allowance.
 - 2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.
 - 3. Submit substantiation of a change in scope of work, if any, claimed in Change Orders related to unit-cost allowances.
 - 4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.
- B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the Purchase Order amount or Contractor's handling, labor, installation, overhead, and profit. Submit claims within 21 days of receipt of the Change Order or Construction Change Directive authorizing work to proceed. Owner will reject claims submitted later than 21 days after such authorization.
 - 1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.

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2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

1.6 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

1.7 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

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

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

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

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SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Sections include the following:
 - 1. Division 01 Section "Allowances" for procedural requirements governing handling and processing of allowances.
 - 2. Division 01 Section "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
 - 3. Division 01 Section "Unit Prices" for administrative requirements governing use of unit prices.
 - 4. Division 01 Section "Construction Progress Documentation" for administrative requirements governing preparation and submittal of Contractor's Construction Schedule and Submittals Schedule.

1.3 DEFINITIONS

- A. Schedule of Values: A statement furnished by Contractor and approved by the Owner allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.
 - 1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:
 - a. Application for Payment forms with Continuation Sheets.
 - b. Submittals Schedule.
 - c. Contractor's Construction Schedule.

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2. Submit the Schedule of Values to Owner at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
 3. Subschedules: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values correlated with each phase of payment.
- B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section.
1. Identification: Include the following Project identification on the Schedule of Values:
 - a. Project name and location.
 - b. Name of Architect.
 - c. Architect's project number.
 - d. Contractor's name and address.
 - e. Date of submittal.
 2. Submit draft of AIA Document G703 Continuation Sheets.
 3. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:
 - a. Related Specification Section or Division.
 - b. Description of the Work.
 - c. Name of subcontractor.
 - d. Name of manufacturer or fabricator.
 - e. Name of supplier.
 - f. Change Orders (numbers) that affect value.
 - g. Dollar value.
 - 1) Percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
 4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate.
 5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
 6. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site. Include evidence of insurance or bonded warehousing.
 7. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.

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8. Allowances: Provide a separate line item in the Schedule of Values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
9. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
 - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.
10. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.
 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction Work covered by each Application for Payment is the period indicated in the Agreement.
- C. Payment Application Times: Progress payments shall be submitted to Architect by the 5th of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.
- D. Payment Application Forms: Use AIA Document G702 and AIA Document G703 Continuation Sheets as form for Applications for Payment.
- E. Payment Application Forms: Use forms provided by Owner for Applications for Payment. Sample copies are included at end of this Section.
- F. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
 1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
 2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.

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- G. Transmittal: Submit 3 signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.
1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- H. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.
1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
 2. When an application shows completion of an item, submit final or full waivers.
 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
 4. Submit final Application for Payment with or preceded by final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
 5. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.
- I. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
 2. Schedule of Values.
 3. Contractor's Construction Schedule (preliminary if not final).
 4. Submittals Schedule (preliminary if not final).
 5. List of Contractor's staff assignments.
 6. Copies of building permits.
 7. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 8. Report of preconstruction conference.
 9. Certificates of insurance and insurance policies.
 10. Performance and payment bonds.
- J. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

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- K. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
 2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 3. Updated final statement, accounting for final changes to the Contract Sum.
 4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
 5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
 6. AIA Document G707, "Consent of Surety to Final Payment."
 7. Evidence that claims have been settled.
 8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
 9. Final, liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

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SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. Administrative and supervisory personnel.
 - 2. Project meetings.
 - 3. Requests for Interpretation (RFIs).
- B. Each contractor shall participate in coordination requirements. Certain areas of responsibility will be assigned to a specific contractor.
- C. Related Sections include the following:
 - 1. Division 01 Section "Construction Progress Documentation" for preparing and submitting Contractor's Construction Schedule.
 - 2. Division 01 Section "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
 - 3. Division 01 Section "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

- A. RFI: Request from Contractor seeking interpretation or clarification of the Contract Documents.

1.4 COORDINATION

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.

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1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
 3. Make adequate provisions to accommodate items scheduled for later installation.
 4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
1. Preparation of Contractor's Construction Schedule.
 2. Preparation of the Schedule of Values.
 3. Installation and removal of temporary facilities and controls.
 4. Delivery and processing of submittals.
 5. Progress meetings.
 6. Preinstallation conferences.
 7. Project closeout activities.
 8. Startup and adjustment of systems.
 9. Project closeout activities.
- D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.
1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. Refer to other Sections for disposition of salvaged materials that are designated as Owner's property.
- 1.5 SUBMITTALS
- A. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.

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1. Post copies of list in Project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

1.6 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

- A. General: In addition to Project superintendent, provide other administrative and supervisory personnel as required for proper performance of the Work.

1.7 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.

- B. Preconstruction Conference: Schedule a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement. Hold the conference at Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.

1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Tentative construction schedule.
 - b. Critical work sequencing and long-lead items.
 - c. Designation of key personnel and their duties.
 - d. Procedures for processing field decisions and Change Orders.
 - e. Procedures for RFIs.
 - f. Procedures for testing and inspecting.
 - g. Procedures for processing Applications for Payment.
 - h. Distribution of the Contract Documents.
 - i. Submittal procedures.
 - j. Preparation of Record Documents.
 - k. Use of the premises.
 - l. Responsibility for temporary facilities and controls.
 - m. Construction waste management and recycling.
 - n. Parking availability.

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- o. Office, work, and storage areas.
 - p. Equipment deliveries and priorities.
 - q. First aid.
 - r. Security.
 - s. Site cleanup.
 - t. Working hours.
 - 3. Minutes: Architect will record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
 - 1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
 - 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. The Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.
 - e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. Review of mockups.
 - i. Possible conflicts.
 - j. Compatibility problems.
 - k. Time schedules.
 - l. Weather limitations.
 - m. Manufacturer's written recommendations.
 - n. Warranty requirements.
 - o. Compatibility of materials.
 - p. Acceptability of substrates.
 - q. Temporary facilities and controls.
 - r. Space and access limitations.
 - s. Regulations of authorities having jurisdiction.
 - t. Testing and inspecting requirements.
 - u. Installation procedures.
 - v. Coordination with other work.
 - w. Required performance results.
 - x. Protection of adjacent work.
 - y. Protection of construction and personnel.
 - 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.

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4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.
 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Progress Meetings: Conduct progress meetings at biweekly intervals. Coordinate dates of meetings with preparation of payment requests.
1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - 1) Review schedule for next period.
 - b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.
 - 5) Off-site fabrication.
 - 6) Access.
 - 7) Site utilization.
 - 8) Temporary facilities and controls.
 - 9) Work hours.
 - 10) Hazards and risks.
 - 11) Progress cleaning.
 - 12) Quality and work standards.
 - 13) Status of correction of deficient items.
 - 14) Field observations.
 - 15) RFIs.
 - 16) Status of proposal requests.
 - 17) Pending changes.
 - 18) Status of Change Orders.

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- 19) Pending claims and disputes.
 - 20) Documentation of information for payment requests.
3. Minutes: Architect will record and distribute to Contractor the meeting minutes.
 4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.
 - a. Schedule Updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

1.8 REQUESTS FOR INTERPRETATION (RFIs)

- A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI in the form specified.
 1. RFIs shall originate with Contractor. RFIs submitted by entities other than Contractor will be returned with no response.
 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing interpretation and the following:
 1. Project name.
 2. Date.
 3. Name of Contractor.
 4. Name of Architect.
 5. RFI number, numbered sequentially.
 6. Specification Section number and title and related paragraphs, as appropriate.
 7. Drawing number and detail references, as appropriate.
 8. Field dimensions and conditions, as appropriate.
 9. Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 10. Contractor's signature.
 11. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.
 - a. Supplementary drawings prepared by Contractor shall include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments.
- C. Hard-Copy RFIs: Identify each page of attachments with the RFI number and sequential page number.

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- D. Software-Generated RFIs: Software-generated form with substantially the same content as indicated above.
1. Attachments shall be electronic files in Adobe Acrobat PDF format.
- E. Architect's Action: Architect will review each RFI, determine action required, and return it. Allow seven working days for Architect's response for each RFI. RFIs received after 1:00 p.m. will be considered as received the following working day.
1. The following RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for coordination information already indicated in the Contract Documents.
 - d. Requests for adjustments in the Contract Time or the Contract Sum.
 - e. Requests for interpretation of Architect's actions on submittals.
 - f. Incomplete RFIs or RFIs with numerous errors.
 2. Architect's action may include a request for additional information, in which case Architect's time for response will start again.
 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 01 Section "Contract Modification Procedures."
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.
- F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.
- G. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log bi-weekly. Use CSI Log Form 13.2B. Include the following:
1. Project name.
 2. Name and address of Contractor.
 3. Name and address of Architect.
 4. RFI number including RFIs that were dropped and not submitted.
 5. RFI description.
 6. Date the RFI was submitted.
 7. Date Architect's response was received.
 8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
 9. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

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SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1. Preliminary Construction Schedule.
2. Contractor's Construction Schedule.
3. Submittals Schedule.
4. Daily construction reports.
5. Material location reports.
6. Field condition reports.
7. Special reports.

- B. Related Sections include the following:

1. Division 01 Section "Payment Procedures" for submitting the Schedule of Values.
2. Division 01 Section "Project Management and Coordination" for submitting and distributing meeting and conference minutes.
3. Division 01 Section "Submittal Procedures" for submitting schedules and reports.
4. Division 01 Section "Quality Requirements" for submitting a schedule of tests and inspections.

1.3 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

1. Critical activities are activities on the critical path. They must start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.

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- B. Cost Loading: The allocation of the Schedule of Values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum, unless otherwise approved by Architect.
- C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.
- D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- E. Event: The starting or ending point of an activity.
- F. Float: The measure of leeway in starting and completing an activity.
 - 1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
 - 2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
 - 3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
- G. Fagnets: A partial or fragmentary network that breaks down activities into smaller activities for greater detail.
- H. Major Area: A story of construction, a separate building, or a similar significant construction element.
- I. Milestone: A key or critical point in time for reference or measurement.
- J. Network Diagram: A graphic diagram of a network schedule, showing activities and activity relationships.
- K. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

1.4 SUBMITTALS

- A. Qualification Data: For scheduling consultant.
- B. Submittals Schedule: Submit three copies of schedule. Arrange the following information in a tabular format:
 - 1. Scheduled date for first submittal.
 - 2. Specification Section number and title.
 - 3. Submittal category (action or informational).
 - 4. Name of subcontractor.

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5. Description of the Work covered.
 6. Scheduled date for Architect's final release or approval.
- C. Preliminary Construction Schedule: Submit two opaque copies.
1. Approval of cost-loaded preliminary construction schedule will not constitute approval of Schedule of Values for cost-loaded activities.
- D. Contractor's Construction Schedule: Submit two opaque copies of initial schedule, large enough to show entire schedule for entire construction period.
1. Submit an electronic copy of schedule, using software indicated, on CD-R, and labeled to comply with requirements for submittals. Include type of schedule (Initial or Updated) and date on label.
- E. CPM Reports: Concurrent with CPM schedule, submit three copies of each of the following computer-generated reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.
1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
 2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
 3. Total Float Report: List of all activities sorted in ascending order of total float.
- F. Special Reports: Submit two copies at time of unusual event.
- 1.5 COORDINATION
- A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.
- B. Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.
1. Secure time commitments for performing critical elements of the Work from parties involved.
 2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

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PART 2 - PRODUCTS

2.1 SUBMITTALS SCHEDULE

- A. Preparation: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, resubmittal, ordering, manufacturing, fabrication, and delivery when establishing dates.
1. Coordinate Submittals Schedule with list of subcontracts, the Schedule of Values, and Contractor's Construction Schedule.
 2. Initial Submittal: Submit concurrently with preliminary bar-chart schedule. Include submittals required during the first 60 days of construction. List those required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
 3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's Construction Schedule.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Procedures: Comply with procedures contained in AGC's "Construction Planning & Scheduling."
- B. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Final Completion.
1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- C. Activities: Treat each story or separate area as a separate numbered activity for each principal element of the Work. Comply with the following:
1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
 2. Procurement Activities: Include procurement process activities for long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 3. Submittal Review Time: Include review and resubmittal times indicated in Division 01 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with Submittals Schedule.
 4. Startup and Testing Time: Include not less than seven days for startup and testing.
 5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.

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- D. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
1. Work Restrictions: Show the effect of the following items on the schedule:
 - a. Coordination with existing construction.
 - b. Limitations of continued occupancies.
 - c. Uninterruptible services.
 - d. Partial occupancy before Substantial Completion.
 - e. Use of premises restrictions.
 - f. Provisions for future construction.
 - g. Seasonal variations.
 - h. Environmental control.
 2. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
 - a. Subcontract awards.
 - b. Submittals.
 - c. Purchases.
 - d. Mockups.
 - e. Fabrication.
 - f. Sample testing.
 - g. Deliveries.
 - h. Installation.
 - i. Tests and inspections.
 - j. Adjusting.
 - k. Curing.
 - l. Startup and placement into final use and operation.
- E. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion.
- F. Computer Software: Prepare schedules using a program that has been developed specifically to manage construction schedules.

2.3 PRELIMINARY CONSTRUCTION SCHEDULE

- A. Bar-Chart Schedule: Submit preliminary horizontal bar-chart-type construction schedule within seven days of date established for the Notice to Proceed.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 60 days of construction. Include skeleton diagram for the remainder of the Work.

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2.4 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal Gantt-chart-type, Contractor's Construction Schedule within 30 days of date established for the Notice to Proceed. Base schedule on the Preliminary Construction Schedule and whatever updating and feedback was received since the start of Project.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
 - 1. For construction activities that require 3 months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

2.5 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
 - 1. List of subcontractors at Project site.
 - 2. List of separate contractors at Project site.
 - 3. Approximate count of personnel at Project site.
 - 4. Equipment at Project site.
 - 5. Material deliveries.
 - 6. High and low temperatures and general weather conditions.
 - 7. Accidents.
 - 8. Meetings and significant decisions.
 - 9. Unusual events (refer to special reports).
 - 10. Stoppages, delays, shortages, and losses.
 - 11. Meter readings and similar recordings.
 - 12. Emergency procedures.
 - 13. Orders and requests of authorities having jurisdiction.
 - 14. Change Orders received and implemented.
 - 15. Construction Change Directives received and implemented.
 - 16. Services connected and disconnected.
 - 17. Equipment or system tests and startups.
 - 18. Partial Completions and occupancies.
 - 19. Substantial Completions authorized.

2.6 SPECIAL REPORTS

- A. General: Submit special reports directly to Owner within one day of an occurrence. Distribute copies of report to parties affected by the occurrence.
- B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of

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results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule before each regularly scheduled progress meeting.
1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
 3. As the Work progresses, indicate Actual Completion percentage for each activity.
- B. Distribution: Distribute copies of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
1. Post copies in Project meeting rooms and temporary field offices.
 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 013200

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SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. Related Sections include the following:
 - 1. Division 01 Section "Payment Procedures" for submitting Applications for Payment and the Schedule of Values.
 - 2. Division 01 Section "Project Management and Coordination" for submitting and distributing meeting and conference minutes and for submitting Coordination Drawings.
 - 3. Division 01 Section "Construction Progress Documentation" for submitting schedules and reports, including Contractor's Construction Schedule and the Submittals Schedule.
 - 4. Division 01 Section "Quality Requirements" for submitting test and inspection reports and for mockup requirements.
 - 5. Division 01 Section "Closeout Procedures" for submitting warranties.
 - 6. Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
 - 7. Division 01 Section "Operation and Maintenance Data" for submitting operation and maintenance manuals.
 - 8. Division 01 Section "Demonstration and Training" for submitting videotapes of demonstration of equipment and training of Owner's personnel.
 - 9. Divisions 02 through 49 Sections for specific requirements for submittals in those Sections.

1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information that requires Architect's responsive action.
- B. Informational Submittals: Written information that does not require Architect's responsive action. Submittals may be rejected for not complying with requirements.

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1.4 SUBMITTAL PROCEDURES

- A. General: Electronic copies of CAD Drawings of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Submittals Schedule: Comply with requirements in Division 01 Section "Construction Progress Documentation" for list of submittals and time requirements for scheduled performance of related construction activities.
- D. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
 - 1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 - 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 - 3. Resubmittal Review: Allow 15 days for review of each resubmittal.
 - 4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.
 - 5. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 15 days for review of each submittal. Submittal will be returned to Architect before being returned to Contractor.
- E. Identification: Place a permanent label or title block on each submittal for identification.
 - 1. Indicate name of firm or entity that prepared each submittal on label or title block.
 - 2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
 - 3. Include the following information on label for processing and recording action taken:
 - a. Project name.
 - b. Date.

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- c. Name and address of Architect.
 - d. Name and address of Contractor.
 - e. Name and address of subcontractor.
 - f. Name and address of supplier.
 - g. Name of manufacturer.
 - h. Submittal number or other unique identifier, including revision identifier.
 - 1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).
 - i. Number and title of appropriate Specification Section.
 - j. Drawing number and detail references, as appropriate.
 - k. Location(s) where product is to be installed, as appropriate.
 - l. Other necessary identification.
- F. Deviations: Highlight, encircle, or otherwise specifically identify deviations from the Contract Documents on submittals.
- G. Additional Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
- 1. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.
 - 2. Additional copies submitted for maintenance manuals will not be marked with action taken and will be returned.
- H. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return submittals, without review, received from sources other than Contractor.
- 1. Transmittal Form: Use AIA Document G810.
 - 2. Transmittal Form: Provide locations on form for the following information:
 - a. Project name.
 - b. Date.
 - c. Destination (To:).
 - d. Source (From:).
 - e. Names of subcontractor, manufacturer, and supplier.
 - f. Category and type of submittal.
 - g. Submittal purpose and description.
 - h. Specification Section number and title.
 - i. Drawing number and detail references, as appropriate.
 - j. Transmittal number.
 - k. Submittal and transmittal distribution record.
 - l. Remarks.

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- m. Signature of transmitter.
 - 3. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same label information as related submittal.
 - I. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
 - 1. Note date and content of previous submittal.
 - 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
 - 3. Resubmit submittals until they are marked "Reviewed" or "Reviewed with Comments as Noted."
 - J. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
 - K. Use for Construction: Use only final submittals with mark indicating "Reviewed" or "Reviewed with Comments as Noted" taken by Architect.
- 1.5 CONTRACTOR'S USE OF ARCHITECT'S CAD FILES
- A. General: At Contractor's written request, copies of Architect's CAD files will be provided to Contractor for Contractor's use in connection with Project, subject to the following conditions:
 - 1. Execution of Architect's standard release form.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

- A. General: Prepare and submit Action Submittals required by individual Specification Sections.
 - 1. Submit electronic submittals directly to extranet specifically established for Project.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
 - 1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
 - 2. Mark each copy of each submittal to show which products and options are applicable.
 - 3. Include the following information, as applicable:

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- a. Manufacturer's written recommendations.
 - b. Manufacturer's product specifications.
 - c. Manufacturer's installation instructions.
 - d. Standard color charts.
 - e. Manufacturer's catalog cuts.
 - f. Wiring diagrams showing factory-installed wiring.
 - g. Printed performance curves.
 - h. Operational range diagrams.
 - i. Mill reports.
 - j. Standard product operation and maintenance manuals.
 - k. Compliance with specified referenced standards.
 - l. Testing by recognized testing agency.
 - m. Application of testing agency labels and seals.
 - n. Notation of coordination requirements.
4. Submit Product Data before or concurrent with Samples.
 5. Number of Copies: Submit six copies of Product Data, unless otherwise indicated. Architect will return four copies.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal of Architect's CAD Drawings are otherwise permitted.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Dimensions.
 - b. Identification of products.
 - c. Layout coordinates and elevations for all vertical and horizontal layouts
 - d. Fabrication and installation drawings.
 - e. Roughing-in and setting diagrams.
 - f. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
 - g. Shopwork manufacturing instructions.
 - h. Templates and patterns.
 - i. Schedules.
 - j. Design calculations.
 - k. Compliance with specified standards.
 - l. Notation of coordination requirements.
 - m. Notation of dimensions established by field measurement.
 - n. Relationship to adjoining construction clearly indicated.
 - o. Seal and signature of professional engineer if specified.
 - p. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.
 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 40 inches.

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3. Number of Copies: Submit six opaque (bond) copies of each submittal. Architect will return four copies.

- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
 1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Generic description of Sample.
 - b. Product name and name of manufacturer.
 - c. Sample source.
 - d. Number and title of appropriate Specification Section.
 3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
 4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
 5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit three sets of Samples. Architect will retain two Sample sets; remainder will be returned.

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- 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
- E. Contractor's Construction Schedule: Comply with requirements specified in Division 01 Section "Construction Progress Documentation" for Construction Manager's action.
- F. Submittals Schedule: Comply with requirements specified in Division 01 Section "Construction Progress Documentation."
- G. Application for Payment: Comply with requirements specified in Division 01 Section "Payment Procedures."
- H. Schedule of Values: Comply with requirements specified in Division 01 Section "Payment Procedures."
- I. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
1. Name, address, and telephone number of entity performing subcontract or supplying products.
 2. Number of Copies: Submit three copies of subcontractor list, unless otherwise indicated.

2.2 INFORMATIONAL SUBMITTALS

- A. General: Prepare and submit Informational Submittals required by other Specification Sections.
1. Number of Copies: Submit two copies of each submittal, unless otherwise indicated. Architect will not return copies.
 2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
 3. Test and Inspection Reports: Comply with requirements specified in Division 01 Section "Quality Requirements."
- B. Contractor's Construction Schedule: Comply with requirements specified in Division 01 Section "Construction Progress Documentation."

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- C. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- D. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.
- E. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- F. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- G. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- H. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- I. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- J. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- K. Research/Evaluation Reports: Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
 - 1. Name of evaluation organization.
 - 2. Date of evaluation.
 - 3. Time period when report is in effect.
 - 4. Product and manufacturers' names.
 - 5. Description of product.
 - 6. Test procedures and results.
 - 7. Limitations of use.
- L. Schedule of Tests and Inspections: Comply with requirements specified in Division 01 Section "Quality Requirements."

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- M. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- N. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements specified in Division 01 Section "Operation and Maintenance Data."
- O. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.
- P. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:
 - 1. Preparation of substrates.
 - 2. Required substrate tolerances.
 - 3. Sequence of installation or erection.
 - 4. Required installation tolerances.
 - 5. Required adjustments.
 - 6. Recommendations for cleaning and protection.
- Q. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:
 - 1. Name, address, and telephone number of factory-authorized service representative making report.
 - 2. Statement on condition of substrates and their acceptability for installation of product.
 - 3. Statement that products at Project site comply with requirements.
 - 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 - 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 - 6. Statement whether conditions, products, and installation will affect warranty.
 - 7. Other required items indicated in individual Specification Sections.
- R. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.
- S. Material Safety Data Sheets (MSDSs): Submit information directly to Owner; do not submit to Architect.

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1. Architect will not review submittals that include MSDSs and will return the entire submittal for resubmittal.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S / ACTION

- A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:
 1. "Reviewed" or "Reviewed with Comments as Noted."
- C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- D. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.
- E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 013300

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SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
- C. Related Sections include the following:
 - 1. Division 01 Section "Construction Progress Documentation" for developing a schedule of required tests and inspections.
 - 2. Division 01 Section "Cutting and Patching" for repair and restoration of construction disturbed by testing and inspecting activities.
 - 3. Divisions 02 through 49 Sections for specific test and inspection requirements.

1.3 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and

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completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.

- C. **Mockups:** Full-size, physical assemblies that are constructed on-site. Mockups are used to verify selections made under sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not Samples. Approved mockups establish the standard by which the Work will be judged.
- D. **Product Testing:** Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.
- E. **Source Quality-Control Testing:** Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.
- F. **Testing Agency:** An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- G. **Installer/Applicator/Erector:** Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 - 1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.
- H. **Experienced:** When used with an entity, "experienced" means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

- A. **General:** If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Architect for a decision before proceeding.
- B. **Minimum Quantity or Quality Levels:** The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

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1.5 SUBMITTALS

- A. Qualification Data: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- B. Reports: Prepare and submit certified written reports that include the following:
 - 1. Date of issue.
 - 2. Project title and number.
 - 3. Name, address, and telephone number of testing agency.
 - 4. Dates and locations of samples and tests or inspections.
 - 5. Names of individuals making tests and inspections.
 - 6. Description of the Work and test and inspection method.
 - 7. Identification of product and Specification Section.
 - 8. Complete test or inspection data.
 - 9. Test and inspection results and an interpretation of test results.
 - 10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
 - 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 - 12. Name and signature of laboratory inspector.
 - 13. Recommendations on retesting and reinspecting.
- C. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.6 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- C. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

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

 - F. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 548; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
 - 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
 - 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

 - G. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

 - H. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
 - 1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
 - 2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
 - 3. Demonstrate the proposed range of aesthetic effects and workmanship.
 - 4. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
 - a. Allow seven days for initial review and each re-review of each mockup.
 - 5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - 6. Demolish and remove mockups when directed, unless otherwise indicated.
- 1.7 QUALITY CONTROL
- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
 - 1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.

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2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- B. Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
 3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 01 Section "Submittal Procedures."
- D. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- E. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 6. Do not perform any duties of Contractor.

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- F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 4. Facilities for storage and field curing of test samples.
 5. Delivery of samples to testing agencies.
 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 7. Security and protection for samples and for testing and inspecting equipment at Project site.
- G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

- A. Prepare a record of tests and inspections. Include the following:
1. Date test or inspection was conducted.
 2. Description of the Work tested or inspected.
 3. Date test or inspection results were transmitted to Architect.
 4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and modifications as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.2 REPAIR AND PROTECTION

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

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1. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
 2. Comply with the Contract Document requirements for Division 01 Section "Cutting and Patching."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

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SECTION 014110 – SPECIAL STRUCTURAL TESTS AND SPECIAL INSPECTIONS

PART 1 GENERAL

1.1. RELATED DOCUMENTS

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

1.2. SUMMARY

- A. Section specifies administrative and procedural requirements for special structural tests and special inspections.
- B. The services include inspections and tests and related actions including reports performed by independent agencies. They do not include Contract enforcement activities performed by Architect.
- C. Inspection and testing services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with Contract Document requirements.
- D. Requirements of this Section relate to production of standard products.
 - 1. Specific structural tests and special inspection requirements for individual construction activities are specified on the design drawings. Those requirements, including inspections and tests, cover production of standard products as well as customized fabrication and installation procedures.
 - 2. Inspections, tests and related actions specified are not intended to limit Contractor's quality control procedures that facilitate compliance with Contract Document requirements.

1.3. RESPONSIBILITIES

- A. Owner Responsibilities: Owner shall bear the costs of the special structural tests and special inspections.
- B. Re-testing: Contractor is responsible for the costs of re-testing where results of required inspections, tests or similar services prove unsatisfactory construction and indicate non-compliance with Contract Document requirements.
- C. Associated Services: Contractor shall cooperate with agencies performing required inspections, tests and similar services and provide reasonable auxiliary services as requested. Notify the agency sufficiently in advance of operations to permit assignment of personnel. Auxiliary services required include, but are not limited to, the following:
 - 1. Providing access to the Work and furnishing incidental labor and facilities necessary to facilitate inspections and tests.

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2. Taking adequate quantities of representative samples of materials that require testing or assisting the agency in taking samples.
 3. Providing facilities for storage and curing of test samples, and delivery of samples to testing laboratories.
 4. Security and protection of samples and test equipment at the Project site.
- D. Duties of Testing Agency: The independent testing agency engaged to perform inspections, sampling and testing of materials and construction specified on the design drawings shall cooperate with the Architect and Contractor in performance of its duties, and shall provide qualified personnel to perform required inspections and tests.
1. Discrepancies shall be brought to the immediate attention of the contractor for correction. If the discrepancies are not corrected, the discrepancies shall be brought to the attention of the building official and to the registered design professional in responsible charge prior to the completion of that phase of the work. A final report of inspections documenting required special inspections and correction of any discrepancies noted in the inspections shall be submitted.
 2. Agency is not authorized to release, revoke, alter or enlarge requirements of the Contract Documents, or approve or accept any portion of the Work.
 3. Agency shall not perform any duties of the Contractor.
- E. Coordination: Contractor and each agency engaged to perform inspections, tests and similar services shall coordinate the sequence of activities to accommodate required services with a minimum of delay. In addition, Contractor and each agency shall coordinate activities to avoid necessity of removing and replacing construction to accommodate inspections and tests.
1. Contractor is responsible for scheduling times for inspections, tests, and similar activities.
- 1.4 SUBMITTALS
- A. The independent testing agency shall submit a certified written report of each inspection, test or similar service to Architect, Engineer-of-Record, and Owner within 3 days of service.
1. Submit additional copies of each written report directly to the governing authority, when the authority so directs.
 2. Report Data: Written reports of each inspection, test or similar service shall include, but not be limited to:
 - a. Date of issue.
 - b. Project title and number.
 - c. Name, address and telephone number of inspection/testing agency.

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- d. Dates and locations of samples and tests or inspections.
- e. Names of individuals making the inspection or test.
- f. Designation of the Work and test method.
- g. Identification of product and Specification Section.
- h. Complete inspection or test data.
- i. Test results and an interpretation of test results.
- j. Ambient conditions at the time of sample-taking and testing.
- k. Comments or professional opinion as to whether inspected or tested Work complies with Contract Document Requirements.
- l. Name and signature of inspector.
- m. Recommendations on retesting.

PART 2 PRODUCTS (not used)

PART 3 EXECUTION

3.1 ACCEPTABLE TESTING AGENCIES

A. Qualification for Service Agencies: Engage inspection and testing service agencies, including independent testing laboratories, which are pre-qualified as complying with “Recommended Requirements for Independent Laboratory Qualification” by the American Council of Independent Laboratories, and which specialize in the types of inspections and tests to be performed.

- 1. Each independent inspection and testing agency engaged on the Project shall be authorized by authorities having jurisdiction to operate in the State in which the Project is located.
- 2. The individual performing the inspections and/or testing shall have a minimum of 5 years experience in the related activity.
- 3. Two weeks prior to start of services, the service agency shall submit qualifications of individuals who will be performing the required tasks.

3.2 REPAIR AND PROTECTION

- A. General: Upon completion of inspection, testing, sample-taking and similar services, contractor shall repair damaged construction and restore substrates and finishes to eliminate deficiencies, including deficiencies in visual qualities of exposed finishes. Comply with Contract Document requirements for “Cutting and Patching”.
- B. Protect construction exposed by or for structural test and special inspection service activities, and protect repaired construction.
- C. Repair and protection is Contractor’s responsibility, regardless of assignment of responsibility for inspection, testing or similar services.

END OF SECTION 014110

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SECTION 014200 - REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

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1.3 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

1.4 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Thomson Gale's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the U.S."
- B. Code Agencies: 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 sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

| | | |
|---------|---|----------------------------------|
| BOCA | BOCA International, Inc. (See ICC) | |
| IAPMO | International Association of Plumbing and Mechanical Officials www.iapmo.org | (909) 472-4100 |
| ICBO | International Conference of Building Officials (See ICC) | |
| ICBO ES | ICBO Evaluation Service, Inc. (See ICC-ES) | |
| ICC | International Code Council www.iccsafe.org | (888) 422-7233 (703) 931-4533 |
| ICC-ES | ICC Evaluation Service, Inc. www.icc-es.org | (800) 423-6587 (562) 699-0543 |

- C. Federal Government Agencies: 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 sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

| | |
|----|---|
| CE | Army Corps of Engineers www.usace.army.mil |
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| | | |
|------|--|----------------------------------|
| CPSC | Consumer Product Safety Commission www.cpsc.gov | (800) 638-2772 (301) 504-7923 |
| DOE | Department of Energy www.energy.gov | (202) 586-9220 |
| EPA | Environmental Protection Agency www.epa.gov | (202) 272-0167 |
| FCC | Federal Communications Commission www.fcc.gov | (888) 225-5322 |
| FDA | Food and Drug Administration www.fda.gov | (888) 463-6332 |
| GSA | General Services Administration www.gsa.gov | (800) 488-3111 |
| HUD | Department of Housing and Urban Development www.hud.gov | (202) 708-1112 |
| LBL | Lawrence Berkeley National Laboratory www.lbl.gov | (510) 486-4000 |
| NIST | National Institute of Standards and Technology www.nist.gov | (301) 975-6478 |
| OSHA | Occupational Safety & Health Administration www.osha.gov | (800) 321-6742 (202) 693-1999 |
| PBS | Public Building Service (See GSA) | |
| USDA | Department of Agriculture www.usda.gov | (202) 720-2791 |

D. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

| | | |
|-------|---|----------------------------------|
| ADAAG | Americans with Disabilities Act (ADA) Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities Available from Access Board | (800) 872-2253 (202) 272-0080 |
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www.access-board.gov

| | | |
|---------|---|----------------------------------|
| CFR | Code of Federal Regulations Available from Government Printing Office www.gpoaccess.gov/cfr/index.html | (866) 512-1800 (202) 512-1800 |
| DOD | Department of Defense Military Specifications and Standards Available from Department of Defense Single Stock Point http://dodssp.daps.dla.mil | (215) 697-2664 |
| DSCC | Defense Supply Center Columbus (See FS) | |
| FED-STD | Federal Standard (See FS) | |
| FS | Federal Specification Available from General Services Administration www.gsa.gov | (215) 697-2664 (202) 619-8925 |
| FTMS | Federal Test Method Standard (See FS) | |
| MIL | (See MILSPEC) | |
| MIL-STD | (See MILSPEC) | |
| MILSPEC | Military Specification and Standards Available from Department of Defense Single Stock Point http://dodssp.daps.dla.mil | (215) 697-2664 |
| UFAS | Uniform Federal Accessibility Standards Available from Access Board www.access-board.gov | (800) 872-2253 (202) 272-0080 |

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200

REFERENCES

014200-4

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SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Sections include the following:
 - 1. Division 01 Section "Summary" for limitations on utility interruptions and other work restrictions.
 - 2. Division 01 Section "Submittal Procedures" for procedures for submitting copies of implementation and termination schedule and utility reports.
 - 3. Division 01 Section "Execution" for progress cleaning requirements.
 - 4. Divisions 02 through 49 Sections for temporary heat, ventilation, and humidity requirements for products in those Sections.
- C. USE OF SITE
 - 1. The Contractor is solely responsible for its site access. The Contractor shall keep all roads, walks, ramps and other areas on and adjacent to the Site in good working order and condition and free from obstructions which might present a hazard to or interference with traffic or the public. When construction operations necessitate the closing of traffic lanes, the Contractor shall be responsible for arranging such closings in advance with the authorities having jurisdiction, the Owner, and adjacent property Owners. The Contractor shall provide adequate barricades, signs and other devices for traffic guides and public safety. Contractor shall maintain all adjacent streets to the Project in a clean condition and shall clean all dirt and mud from the Project and from such adjacent street on a daily basis.

1.3 DEFINITIONS

- A. Permanent Enclosure: As determined by Architect, permanent or temporary roofing is complete, insulated, and weathertight; exterior walls are insulated and weathertight; and all openings are closed with permanent construction or substantial temporary closures.

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1.4 USE CHARGES

- A. General: Cost or use charges for temporary facilities shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Architect, testing agencies, and authorities having jurisdiction.
- B. Sewer Service: Pay sewer service use charges for sewer usage by all entities for construction operations.
- C. Electric Power Service: Pay electric power service use charges for electricity used by all entities for construction operations.
- D. Water Service: Contractor is responsible for providing all water for all entities for construction operations. Pay water service use charges for water used by all entities for construction operations.

1.5 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.6 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Portable Chain-Link Fencing: Minimum **2-inch**, 9-gage, galvanized steel, chain-link fabric fencing; minimum **6 feet** high with galvanized steel pipe posts; minimum **2-3/8-inch**- OD line posts and **2-7/8-inch**- OD corner and pull posts, with **1-5/8-inch**- OD top and bottom rails. Provide concrete bases for supporting posts.
- B. Tree Protection inside the Trees Dripline:
 - 1. Wood Boards: 6" x 6' x 2" thick boards loosely cabled at top, bottom and center.
 - 2. Hay Bales

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3. Plywood: $\frac{3}{4}$ " thick plywood sheets at tree base to absorb or spread any vehicular loads over the root area within the tree dripline.

2.2 TEMPORARY FACILITIES

- A. Field Offices, General (if needed): Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Common-Use Field Office (if needed): Of sufficient size to accommodate needs of construction personnel. Keep office clean and orderly. Furnish and equip offices as follows:
 1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
 2. Conference room of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-V ac duplex receptacles, with not less than 1 receptacle on each wall. Furnish room with conference table, chairs, and 4-foot- square tack board.
 3. Drinking water.
 4. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F.
 5. Lighting fixtures capable of maintaining average illumination of 20 fc at desk height.
- C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
 1. Store combustible materials apart from building.

2.3 EQUIPMENT

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

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
 1. Locate facilities to limit site disturbance as specified in Division 01 Section "Summary."
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

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3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
 - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
- C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
- D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- E. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
 - 1. Install electric power service overhead or underground, unless otherwise indicated.
- F. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
 - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
- G. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install one telephone line(s) for each field office.
 - 1. Provide additional telephone lines for the following:
 - a. Provide a dedicated telephone line for each facsimile machine and computer in each field office.
 - 2. At each telephone, post a list of important telephone numbers.
 - a. Police and fire departments.
 - b. Ambulance service.
 - c. Contractor's home office.
 - d. Architect's office.
 - e. Engineers' offices.
 - f. Owner's office.
 - g. Principal subcontractors' field and home offices.
 - 3. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

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- H. Electronic Communication Service: Provide temporary electronic communication service, including electronic mail, in common-use facilities.
 - 1. Provide DSL in primary field office.

3.3 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
 - 1. Provide incombustible construction for offices, shops, and sheds located within construction area or within 30 feet of building lines. Comply with NFPA 241.
 - 2. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- B. Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas in same location as permanent roads and pavement areas. Extend temporary roads and paved areas within construction limits indicated, as necessary for construction operations. Where temporary roads cannot be located in areas of permanent roads, or where temporary roads exceed the construction limits and areas of required clearing, the contractor shall seek review and authorization to clear and/or construct the temporary road prior to initiating clearing and construction.
 - 1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
 - 2. Prepare subgrade and install subbase and base for temporary roads and paved areas according to Division 31 Section "Earth Moving."
 - 3. Recondition base after temporary use, including removing contaminated material, regrading, proofrolling, compacting, and testing.
 - 4. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course according to Division 32 Section "Asphalt Paving."
 - 5. Temporary roads not located in areas of permanent roads shall be fully restored to existing conditions; cost of temporary road construction and restoration is incidental to the project costs.
- C. Traffic Controls: Comply with requirements of authorities having jurisdiction. Maintain traffic on US60 per KYTC requirements.
 - 1. Protect existing site improvements to remain including curbs, pavement, and utilities.
 - 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- D. Parking: Use designated areas of Owner's existing parking areas for construction personnel, or provide temporary.

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- E. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
 - 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties nor endanger permanent Work or temporary facilities.
 - 2. Remove snow and ice as required to minimize accumulations.
- F. Project Identification and Temporary Signs: Provide Project identification and other signs as needed. Locations to be coordinated with Architect. Install signs to inform public and individuals seeking entrance to Project. Unauthorized signs are not permitted.
 - 1. Provide temporary, directional signs for construction personnel and visitors.
 - 2. Maintain and touchup signs so they are legible at all times.
- G. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with Division 01 Section "Execution" for progress cleaning requirements.
- H. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
 - 1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
 - 1. Comply with work restrictions specified in Division 01 Section "Summary."
- B. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.
 - 1. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
- C. Stormwater Control: Comply with authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- D. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

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- E. Security Enclosure and Lockup: Contractor is responsible for securing all open spaces in the project site. All security measures are to be reviewed by the Owner and Architect before commencement of work.
- F. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

3.5 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
 - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 - 1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 - 2. Remove temporary paving not intended for or acceptable for integration into permanent paving. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
 - 3. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 01 Section "Closeout Procedures."

END OF SECTION 015000

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SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; product substitutions; and comparable products.
- B. Related Sections include the following:
 - 1. Division 01 Section "Allowances" for products selected under an allowance.
 - 2. Division 01 Section "References" for applicable industry standards for products specified.
 - 3. Division 01 Section "Closeout Procedures" for submitting warranties for Contract closeout.
 - 4. Divisions 02 through 49 Sections for specific requirements for warranties on products and installations specified to be warranted.

1.3 DEFINITIONS

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

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- B. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
- C. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.

1.4 SUBMITTALS

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

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2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within 7 days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.
 - a. Form of Acceptance: Change Order.
 - b. Use product specified if Architect cannot make a decision on use of a proposed substitution within time allocated.
- B. Comparable Product Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 1. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.
 - a. Form of Approval: As specified in Division 01 Section "Submittal Procedures."
 - b. Use product specified if Architect cannot make a decision on use of a comparable product request within time allocated.
 - C. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 01 Section "Submittal Procedures." Show compliance with requirements.
- 1.5 QUALITY ASSURANCE
 - A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.
- 1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING
 - A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.
 - B. Delivery and Handling:
 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.

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3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Store cementitious products and materials on elevated platforms.
5. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
7. Protect stored products from damage and liquids from freezing.

1.7 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
 1. **Manufacturer's Warranty:** Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
 2. **Special Warranty:** Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.
- B. **Special Warranties:** Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.
 1. **Manufacturer's Standard Form:** Modified to include Project-specific information and properly executed.
 2. **Specified Form:** When specified forms are included with the Specifications, prepare a written document using appropriate form properly executed.
 3. Refer to Divisions 02 through 49 Sections for specific content requirements and particular requirements for submitting special warranties.
- C. **Submittal Time:** Comply with requirements in Division 01 Section "Closeout Procedures."

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PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, that are new at time of installation.
1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
 4. Where products are accompanied by the term "as selected," Architect will make selection.
 5. Where products are accompanied by the term "match sample," sample to be matched is Architect's.
 6. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.
 7. Or Equal: Where products are specified by name and accompanied by the term "or equal" or "or approved equal" or "or approved," comply with provisions in Part 2 "Comparable Products" Article to obtain approval for use of an unnamed product.
- B. Product Selection Procedures:
1. Product: Where Specifications name a single product and manufacturer, provide the named product that complies with requirements.
 2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements.
 3. Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.
 4. Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.
 5. Available Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
 6. Available Manufacturers: Where Specifications include a list of manufacturers, provide a product by one of the manufacturers listed, or an unnamed manufacturer, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
 7. Product Options: Where Specifications indicate that sizes, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide the specified product or system. Comply with provisions in Part 2 "Product Substitutions" Article for consideration of an unnamed product or system.

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8. Basis-of-Design Product: Where Specifications name a product and include a list of manufacturers, provide the specified product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product by the other named manufacturers.
9. Visual Matching Specification: Where Specifications require matching an established Sample, select a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
 - a. If no product available within specified category matches and complies with other specified requirements, comply with provisions in Part 2 "Product Substitutions" Article for proposal of product.
10. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product that complies with other specified requirements.
 - a. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that does not include premium items.
 - b. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 PRODUCT SUBSTITUTIONS

- A. Timing: Architect will consider requests for substitution if received within 60 days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of Architect.
- B. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 1. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
 2. Requested substitution does not require extensive revisions to the Contract Documents.
 3. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 4. Substitution request is fully documented and properly submitted.
 5. Requested substitution will not adversely affect Contractor's Construction Schedule.

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6. Requested substitution has received necessary approvals of authorities having jurisdiction.
7. Requested substitution is compatible with other portions of the Work.
8. Requested substitution has been coordinated with other portions of the Work.
9. Requested substitution provides specified warranty.
10. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

2.3 COMPARABLE PRODUCTS

- A. Conditions: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
1. Evidence that the proposed product does not require extensive revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
 2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 3. Evidence that proposed product provides specified warranty.
 4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
 5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

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SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. General installation of products.
 - 4. Progress cleaning.
 - 5. Starting and adjusting.
 - 6. Protection of installed construction.
 - 7. Correction of the Work.
- B. Related Sections include the following:
 - 1. Division 01 Section "Project Management and Coordination" for procedures for coordinating field engineering with other construction activities.
 - 2. Division 01 Section "Cutting and Patching" for procedural requirements for cutting and patching necessary for the installation or performance of other components of the Work.
 - 3. Division 01 Section "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

1.3 SUBMITTALS

- A. Qualification Data: For land surveyor, if requested.
- B. Certificates: Submit certificate signed by land surveyor certifying that location and elevation of improvements comply with requirements.

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1.4 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.
 - 1. Before construction, verify the location and points of connection of utility services.
 - 2. Before construction, provide layout coordinates and elevations for all vertical and horizontal layouts as part of the shop submittals process.
- B. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction affecting the Work.
 - 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; and underground electrical services.
 - 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- C. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 - 1. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 - a. Description of the Work.
 - b. List of detrimental conditions, including substrates.
 - c. List of unacceptable installation tolerances.
 - d. Recommended corrections.

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2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
4. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
5. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. **Field Measurements:** Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- B. **Space Requirements:** Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- C. **Review of Contract Documents and Field Conditions:** Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

3.3 CONSTRUCTION LAYOUT

- A. **Verification:** Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly. Provide layout coordinates and elevations for all vertical and horizontal layouts.
- B. **General:** Engage a land surveyor to lay out the Work using accepted surveying practices.
 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
 2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 3. Inform installers of lines and levels to which they must comply.
 4. Check the location, level and plumb, of every major element as the Work progresses.
 5. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
 6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

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- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

- A. Identification: Owner will identify existing benchmarks, control points, and property corners.
- B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
 - 1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
 - 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- C. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
 - 1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
 - 2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
 - 3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

3.5 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 - 1. Make vertical work plumb and make horizontal work level.
 - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.

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3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
 4. Maintain minimum headroom clearance of 7'-6" in spaces without a suspended ceiling.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- G. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.
1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
 2. Allow for building movement, including thermal expansion and contraction.
 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.
1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F.

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3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
 - B. Site: Maintain Project site free of waste materials and debris.
 - C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 1. Remove liquid spills promptly.
 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
 - D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
 - E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
 - F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
 - G. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.
 - H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
 - I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
 - J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.
- 3.7 STARTING AND ADJUSTING
- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
 - B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.
 - C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

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- D. Manufacturer's Field Service: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Division 01 Section "Quality Requirements."

3.8 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.9 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 01 Section "Cutting and Patching."
 - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Restore permanent facilities used during construction to their specified condition.
- C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 017300

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SECTION 017329 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes procedural requirements for cutting and patching.
- B. Related Sections include Divisions 02 through 49 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.

1.3 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other Work.
- B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.4 QUALITY ASSURANCE

- A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.
- B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operating elements include the following:
 - 1. Primary operational systems and equipment.
 - 2. Mechanical systems piping and ducts.
 - 3. Control systems.
 - 4. Communication systems.
 - 5. Electrical wiring systems.
- C. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity, that results in reducing their

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capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Miscellaneous elements include the following:

1. Water, moisture, or vapor barriers.
 2. Membranes and flashings.
 3. Equipment supports.
 4. Piping, ductwork, vessels, and equipment.
- D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
 1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.
 2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

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

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- B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.

3.3 PERFORMANCE

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Concrete: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 - 4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
 - 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 - 6. Proceed with patching after construction operations requiring cutting are complete.
- C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.
 - 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.

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2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.
 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
 4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.
- D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

END OF SECTION 017329

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SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for Disposing of nonhazardous demolition and construction waste.
- B. Related Sections include the following:
 - 1. Division 02 Section "Selective Demolition" for disposition of waste resulting from demolition of buildings, structures, and site improvements.
 - 2. Division 31 Section "Site Clearing" for disposition of waste resulting from site clearing and removal of above- and below-grade improvements.

1.3 DEFINITIONS

- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
- C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 DISPOSAL OF WASTE

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

END OF SECTION 017419

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SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

- 1. Inspection procedures.
- 2. Warranties.
- 3. Final cleaning.

- B. Related Sections include the following:

- 1. Division 01 Section "Payment Procedures" for requirements for Applications for Payment for Substantial and Final Completion.
- 2. Division 01 Section "Execution" for progress cleaning of Project site.
- 3. Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
- 4. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
- 5. Division 01 Section "Demonstration and Training" for requirements for instructing Owner's personnel.
- 6. Divisions 02 through 49 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.3 SUBSTANTIAL COMPLETION

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

- 1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
- 2. Advise Owner of pending insurance changeover requirements.
- 3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.

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4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
5. Prepare and submit Project Record Documents, operation and maintenance manuals, and similar final record information.
6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
7. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
8. Complete startup testing of systems.
9. Submit test/adjust/balance records.
10. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
11. Advise Owner of changeover in heat and other utilities.
12. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
13. Complete final cleaning requirements, including touchup painting.
14. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

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

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

1.4 FINAL COMPLETION

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

1. Submit a final Application for Payment according to Division 01 Section "Payment Procedures."
2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

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- B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
 - 1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Preparation: Submit three copies of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
 - 1. Organize list of spaces in sequential order, starting with exterior areas first.
 - 2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
 - 3. Include the following information at the top of each page:
 - a. Project name.
 - b. Date.
 - c. Name of Architect.
 - d. Name of Contractor.
 - e. Page number.

1.6 WARRANTIES

- A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.
- B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
 - 1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive **8-1/2-by-11-inch** paper.
 - 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the

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- product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
- D. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. **Cleaning Agents:** Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. **General:** Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. **Cleaning:** Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Remove snow and ice to provide safe access to building.
 - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.

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- g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - h. Sweep concrete floors broom clean in unoccupied spaces.
 - i. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - j. Remove labels that are not permanent.
 - k. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
 - 1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
 - l. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint droppings, and other foreign substances.
 - m. Replace parts subject to unusual operating conditions.
 - n. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - o. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - p. Clean ducts, blowers, and coils if units were operated without filters during construction.
 - q. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
 - r. Leave Project clean and ready for occupancy.
- C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION 017700

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SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Operation and maintenance documentation directory.
 - 2. Emergency manuals.
 - 3. Operation manuals for systems, subsystems, and equipment.
 - 4. Maintenance manuals for the care and maintenance of products, materials, finishes, systems, and equipment.
- B. Related Sections include the following:
 - 1. Division 01 Section "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
 - 2. Division 01 Section "Closeout Procedures" for submitting operation and maintenance manuals.
 - 3. Division 01 Section "Project Record Documents" for preparing Record Drawings for operation and maintenance manuals.
 - 4. Divisions 02 through 49 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

1.3 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 SUBMITTALS

- A. Initial Submittal: Submit one draft copy of each manual at least 15 days before requesting inspection for Substantial Completion. Include a complete operation and maintenance

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directory. Architect will return one copy of draft and mark whether general scope and content of manual are acceptable.

- B. Final Submittal: Submit one copy of each manual in final form at least 15 days before final inspection. Architect will return copy with comments within 15 days after final inspection.
 - 1. Correct or modify each manual to comply with Architect's comments. Submit 3 copies of each corrected manual within 15 days of receipt of Architect's comments.

1.5 COORDINATION

- A. Where operation and maintenance documentation includes information on installations by more than one factory-authorized service representative, assemble and coordinate information furnished by representatives and prepare manuals.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

- A. Organization: Include a section in the directory for each of the following:
 - 1. List of documents.
 - 2. List of systems.
 - 3. List of equipment.
 - 4. Table of contents.
- B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
- C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
- D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

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2.2 MANUALS, GENERAL

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
1. Title page.
 2. Table of contents.
 3. Manual contents.
- B. Title Page: Enclose title page in transparent plastic sleeve. Include the following information:
1. Subject matter included in manual.
 2. Name and address of Project.
 3. Name and address of Owner.
 4. Date of submittal.
 5. Name, address, and telephone number of Contractor.
 6. Name and address of Architect.
 7. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
1. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold **8-1/2-by-11-inch** paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
 - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
 - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.
 2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section. Mark each tab to indicate contents. Include typed list of products and major components of

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equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.

3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
 - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
 - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 EMERGENCY MANUALS

- A. Content: Organize manual into a separate section for each of the following:
 1. Type of emergency.
 2. Emergency instructions.
 3. Emergency procedures.
- B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
 1. Flood.
- C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- D. Emergency Procedures: Include the following, as applicable:
 1. Instructions on stopping.
 2. Shutdown instructions for each type of emergency.
 3. Operating instructions for conditions outside normal operating limits.
 4. Required sequences for electric or electronic systems.
 5. Special operating instructions and procedures.

2.4 OPERATION MANUALS

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
 1. System, subsystem, and equipment descriptions.
 2. Performance and design criteria if Contractor is delegated design responsibility.
 3. Operating standards.

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4. Operating procedures.
5. Operating logs.
6. Wiring diagrams.
7. Control diagrams.
8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:

1. Product name and model number.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.5 PRODUCT MAINTENANCE MANUAL

- A. Content: Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

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- C. Product Information: Include the following, as applicable:
 - 1. Product name and model number.
 - 2. Manufacturer's name.
 - 3. Color, pattern, and texture.
 - 4. Material and chemical composition.
 - 5. Reordering information for specially manufactured products.

- D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
 - 1. Inspection procedures.
 - 2. Types of cleaning agents to be used and methods of cleaning.
 - 3. List of cleaning agents and methods of cleaning detrimental to product.
 - 4. Schedule for routine cleaning and maintenance.
 - 5. Repair instructions.

- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - 1. Include procedures to follow and required notifications for warranty claims.

2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUAL

- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

- B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
 - 1. Standard printed maintenance instructions and bulletins.
 - 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 - 3. Identification and nomenclature of parts and components.
 - 4. List of items recommended to be stocked as spare parts.

- D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

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1. Test and inspection instructions.
 2. Troubleshooting guide.
 3. Precautions against improper maintenance.
 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 5. Aligning, adjusting, and checking instructions.
 6. Demonstration and training videotape, if available.
- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

- A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- B. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- C. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
 1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.

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2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- D. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
- E. Comply with Division 01 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 017823

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SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for Project Record Documents, including Record Drawings.
- B. Related Sections include the following:
 - 1. Division 01 Section "Closeout Procedures" for general closeout procedures.
 - 2. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
 - 3. Divisions 02 through 49 Sections for specific requirements for Project Record Documents of the Work in those Sections.

1.3 SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit one set(s) of marked-up Record Prints.
 - 2. Number of Copies: Submit copies of Record Drawings as follows:
 - a. Initial Submittal: Submit one set of marked-up Record Prints. Architect will initial, date, and mark whether general scope of changes, additional information recorded, and quality of drafting are acceptable. Architect will return prints for organizing into sets, printing, binding, and final submittal.
 - b. Final Submittal: Submit one set of marked-up Record Prints. Print each Drawing, whether or not changes and additional information were recorded.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of blue- or black-line white prints of the Contract Drawings and Shop Drawings.

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1. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Accurately record information in an understandable drawing technique.
 - c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
2. Content: Types of items requiring marking include, but are not limited to, the following:
 - a. Dimensional changes to Drawings.
 - b. Revisions to details shown on Drawings.
 - c. Depths of foundations below first floor.
 - d. Locations and depths of underground utilities.
 - e. Revisions to routing of piping and conduits.
 - f. Revisions to electrical circuitry.
 - g. Actual equipment locations.
 - h. Duct size and routing.
 - i. Locations of concealed internal utilities.
 - j. Changes made by Change Order or Construction Change Directive.
 - k. Changes made following Architect's written orders.
 - l. Details not on the original Contract Drawings.
 - m. Field records for variable and concealed conditions.
 - n. Record information on the Work that is shown only schematically.
3. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

2.2 MISCELLANEOUS RECORD SUBMITTALS

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

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PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.
- B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.

END OF SECTION 017839

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SECTION 017900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
 - 1. Demonstration of operation of systems, subsystems, and equipment.
 - 2. Training in operation and maintenance of systems, subsystems, and equipment.
- B. Related Sections include the following:
 - 1. Division 01 Section "Project Management and Coordination" for requirements for preinstruction conferences.
 - 2. Divisions 02 through 49 Sections for specific requirements for demonstration and training for products in those Sections.

1.3 SUBMITTALS

- A. Instruction Program: Submit two copies of outline of instructional program for demonstration and training, including a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module.
- B. Attendance Record: For each training module, submit list of participants and length of instruction time.

1.4 QUALITY ASSURANCE

- A. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Division 01 Section "Quality Requirements," experienced in operation and maintenance procedures and training.

1.5 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations.

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- B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
- C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections, and as follows:
 - 1. Motorized doors, including overhead coiling doors overhead coiling grilles and automatic entrance doors.
 - 2. HVAC systems, including exhaust fans.
 - 3. HVAC instrumentation and controls.
 - 4. Electrical service and distribution, including transformers, switchboards, and panelboards.
 - 5. Equipment, including ejector sewerage pump.
 - 6. Lighting equipment and controls.
 - 7. Communication systems, including emergency phone.
 - 8. Splash play equipment.
 - 9. Irrigation system.
- B. Training Modules: Include instruction for the following:
 - 1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
 - a. System, subsystem, and equipment descriptions.
 - b. Performance and design criteria if Contractor is delegated design responsibility.
 - c. Operating standards.
 - d. Regulatory requirements.
 - e. Equipment function.
 - f. Operating characteristics.
 - g. Limiting conditions.
 - h. Performance curves.
 - 2. Documentation: Review the following items in detail:
 - a. Emergency manuals.
 - b. Operations manuals.
 - c. Maintenance manuals.
 - d. Project Record Documents.
 - e. Identification systems.

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- f. Warranties and bonds.
 - g. Maintenance service agreements and similar continuing commitments.
3. Emergencies: Include the following, as applicable:
 - a. Instructions on meaning of warnings, trouble indications, and error messages.
 - b. Instructions on stopping.
 - c. Shutdown instructions for each type of emergency.
 - d. Operating instructions for conditions outside of normal operating limits.
 - e. Sequences for electric or electronic systems.
 - f. Special operating instructions and procedures.
 - g. Flood event procedures.
4. Operations: Include the following, as applicable:
 - a. Startup procedures.
 - b. Equipment or system break-in procedures.
 - c. Routine and normal operating instructions.
 - d. Regulation and control procedures.
 - e. Control sequences.
 - f. Safety procedures.
 - g. Instructions on stopping.
 - h. Normal shutdown instructions.
 - i. Operating procedures for emergencies.
 - j. Operating procedures for system, subsystem, or equipment failure.
 - k. Seasonal and weekend operating instructions.
 - l. Required sequences for electric or electronic systems.
 - m. Special operating instructions and procedures.
 - n. Winterization procedures.
5. Adjustments: Include the following:
 - a. Alignments.
 - b. Checking adjustments.
 - c. Noise and vibration adjustments.
 - d. Economy and efficiency adjustments.
6. Troubleshooting: Include the following:
 - a. Diagnostic instructions.
 - b. Test and inspection procedures.
7. Maintenance: Include the following:
 - a. Inspection procedures.
 - b. Types of cleaning agents to be used and methods of cleaning.
 - c. List of cleaning agents and methods of cleaning detrimental to product.
 - d. Procedures for routine cleaning

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- e. Procedures for preventive maintenance.
 - f. Procedures for routine maintenance.
 - g. Instruction on use of special tools.
8. Repairs: Include the following:
- a. Diagnosis instructions.
 - b. Repair instructions.
 - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - d. Instructions for identifying parts and components.
 - e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 INSTRUCTION

- A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
- B. Scheduling: Provide instruction at mutually agreed on times.
 - 1. Schedule training with Owner, through Architect, with at least seven days' advance notice.
- C. Cleanup: Collect used and leftover educational materials and remove from Project site. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

END OF SECTION 017900

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SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Demolition and removal of selected site elements.

- B. Related Requirements:

- 1. Section 015639 "Temporary Tree and Plant Protection" for temporary protection of existing trees and plants that are affected by selective demolition.
 - 2. Section 017419 "Construction Waste Management and Disposal."
 - 3. Section 311000 "Site Clearing" for site clearing and removal of above- and below-grade improvements.
 - 4. Section 312000 "Earth Moving" for soil materials, excavating, backfilling, and site grading.
 - 5. Section 329210 "Erosion Prevention and Sedimentation Control" for preventing erosion and controlling sediment laden runoff from disturbed areas.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner's designated storage area. Stack material on wood sleepers, sorted by type, in an orderly and safe fashion.
- C. Existing to Remain: Existing structures or features that are not to be permanently removed, disturbed or damaged. Protect construction noted to remain against damage and soiling during selective demolition.
- D. "Owner's property" includes areas within the project limits shown on the plan, unless noted otherwise.

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1.4 MATERIALS OWNERSHIP

- A. Demolition waste becomes property of Contractor and shall be removed from the site with further disposition at the Contractor's option, except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain on the Owner's property

1.5 CLOSEOUT SUBMITTALS

- A. Record drawings at project closeout according to Division 1 Section "Contract Closeout".
 - 1. Identify and accurately locate capped utilities and other subsurface utility, structural, electrical, communication, or mechanical conditions.
- B. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.6 QUALITY ASSURANCE

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

1.7 PROJECT CONDITIONS

- A. Storage or sale of removed items or materials on-site will not be permitted.
- B. Abandoned utilities on the site shall either be removed, capped, or safe loaded.

PART 2 - PRODUCTS

2.1 REPAIR MATERIALS

- A. Use repair materials identical to existing materials..
 - 1. Where identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible..
 - 2. Use a material whose installed performance equals or surpasses that of existing materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

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- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- C. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.
- D. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.2 UTILITY SERVICES

- A. Maintain services/systems indicated to remain in service and protect them against damage.
 - 1. Do not interrupt existing utilities serving occupied or operating facilities, except when authorized in writing by the Owner and authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to the Owner and to governing authorities.
 - a. Provide not less than 72 hours notice to Owner if shutdown of service is required during changeover.
- B. Utility Requirements: Locate and identify and disconnect, remove, safe load, or cap off indicated utility services.
 - 1. Arrange to shut off indicated utilities with utility companies.

3.3 PREPARATION

- A. Conduct selective demolition operations and remove debris to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
- B. Conduct demolition operations to prevent injury to people and damage to adjacent buildings and facilities to remain. Ensure safe passage of people around selective demolition area.
 - 1. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.
 - 2. Protect existing site improvements, appurtenances, and landscaping to remain.

3.4 POLLUTION CONTROLS

- A. Install Erosion Prevention and Sediment Control facilities prior to beginning demolition work.

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- B. Use water mist, temporary enclosures, and other suitable methods to limit the spread of dust and dirt. Comply with governing environmental protection regulations.
 - 1. Do not use water when it may damage existing construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.
- C. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas

3.5 SELECTIVE DEMOLITION

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - 1. Dispose of demolished items and materials promptly. On-site storage or sale of removed items is prohibited.
 - 2. Return elements of construction and surfaces to remain to condition existing before start of selective demolition operations.
- B. Break up and remove concrete slabs on grade, foundation walls, and asphalt pavement on the site, unless otherwise shown to remain.

3.6 PATCHING AND REPAIRS

- A. Promptly patch and repair holes and damaged surfaces caused to adjacent construction by selective demolition operations.

3.7 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain on the Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
 - 1. Do not allow demolished materials to accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 - 3. Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."
- B. Burning: Do not burn demolished materials.
- C. Disposal: Transport demolished materials off Owner's property and dispose of them in accordance with prevailing regulation and law.

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3.8 CLEANING

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

END OF SECTION 024119

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SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 WORK INCLUDED

- A. This section includes furnishing all labor, tools, materials, equipment and services necessary to properly place and complete all cast-in-place concrete work, both plain and reinforced, including reinforcing steel, forms and other necessary items indicated and/or specified herein and removal of forms.

1.2 RELATED DOCUMENTS

- A. The General Provisions of the contract, including General Conditions, Supplemental Conditions and Special Conditions apply to work specified herein.
- B. Upon award of contract, the contractor will be furnished a form (See Exhibit "A") similar to that shown at the end of this Section for submittal to the Architect as a part of the mix design submittal.
- C. Materials shall comply with requirements of designated specifications of American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania.
- D. Construction procedures shall comply with recommendations set forth in designated standards of American Concrete Institute, P.O. Box 9094, Farmington Hills, Michigan 48333.
- E. Current edition of referenced Specifications and Standards shall prevail.
- F. "Specifications for Structural Concrete" – ACI 301-99 shall apply to work specified herein.

PART 2 MATERIALS

2.1 CONCRETE MATERIALS

- A. All materials shall be manufactured in the United States of America. Material certificates signed by supplier and contractor certifying that each material item complies with, or exceeds, the specified requirements shall be furnished by the material manufacturer through the general contractor.
- B. Portland Cement, Type 1, meeting requirements of A.S.T.M. C150. One brand of cement shall be used throughout the work.
- C. Aggregates A.S.T.M. C33.

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- D. Aggregates (structural lightweight concrete) ASTM C330.
- E. Local aggregates of proven durability may be used when acceptable to the Architect.
- F. Coarse aggregate for regular weight concrete may be dredged Ohio River gravel or crushed stone.
- G. Coarse aggregate for structural lightweight concrete may be rotary kiln expanded clays, shales and slates, or expanded slags.
- H. Water, clean, fresh & potable.

2.2 ADMIXTURES

- A. Air-entraining A.S.T.M. C260
- B. Chemical (Type subject to approval) A.S.T.M. C494
- C. Fly ash shall conform with ASTM C618, Class F or C. Fly ash content shall not exceed 20% by weight of the total cementitious content of the mix.
- D. Prohibited Admixtures: Calcium chloride, thiocyanates or admixtures containing more than 0.05% chloride ions are not permitted.
- E. Certification: Written conformance to the above-mentioned requirements and the chloride ion content of the admixture will be required from the admixture manufacturer prior to mix design review by the Engineer.

2.3 METAL REINFORCEMENT

- A. Stirrups and column ties A.S.T.M. A615 Grade 60
- B. All other reinforcement A.S.T.M. A615 Grade 60
w/supplementary requirements (S1)
- C. Welded Wire Fabric A.S.T.M. A185
- D. Metal accessories including spacers, chairs, ties and other devices necessary for properly assembling, placing, spacing and supporting all reinforcement in place shall be provided. Ties shall be of such type as to leave no metal closer than 3/4" from the concrete surface.

2.4 JOINT FILLER

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- A. Pre-molded joint filler strips shall be resilient, compressible, re-expanding, non-extruding, of the thickness indicated.

2.5 FORM OIL

- A. Form oil shall be an approved commercial formulation of proven performance that will not bond with, stain, nor adversely affect concrete surfaces, and will not impair subsequent treatment and curing of concrete surfaces.

2.6 CURING COMPOUND

- A. Curing compound shall be acrylic base type conforming to AASHTO M-148 and A.S.T.M. C309. The material shall be equal to Sonneborn Kur-N-Seal, Masterseal (by Master Builders), or Clear Seal (by W.R. Grace).

2.7 NON-SHRINK GROUT

- A. Non-shrink, non-metallic grout for use beneath column base plates shall be premixed, factory packaged, non-staining, non-metallic, non-gasing mortar grouting compound, conforming to ASTM C1107, "Standard Specification for packaged Dry, Hydraulic-Cement Grout (Non-shrink)." In addition, the grout manufacturer shall furnish test data from an independent laboratory indicating that the grout when placed at a fluid consistency shall achieve 95% bearing under a 4' X 4' base plate. The non-shrink grout shall be "Euco NS" by the Euclid Chemical Co., "Masterflow 713" by Master Builders, or approved equal. Grout shall have a minimum compressive strength of 5,000 psi.

2.8 BONDING AND REPAIR MATERIALS

- A. Bonding Compounds: The compound shall be a polyvinyl acetate type, Rewettable: "Euco Weld" by the Euclid Chemical Co. or "Weldcrete" by the Larsen Co. Use only in areas not subject to moisture. Non-Rewettable, Polymer modified bonding compound: "Euco-Bond" by the Euclid Chemical Company or approved equal.
- B. Epoxy Adhesive: The compound shall be a two (2) component, 100% solids, 100% reactive compound suitable for use on dry or damp surfaces, "Euco Epoxy No. 452MV or No. 620" by the Euclid Chemical Co. or "Sikadure Hi-Mod" by the Sika Chemical Corp.

PART 3 APPLICATION

3.1 PROPORTIONING CONCRETE

- A. Admixture other than air-entraining shall not be used without written approval of Architect. See Paragraph 2.02 of this section.

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- B. Ready mixed concrete shall be used. It shall comply with applicable provision of A.S.T.M. C94 and as specified herein.
- C. Batching system shall be automatic and shall record each material as batched prior to discharge into mixer and zero referenced following discharge. This record shall be marked to permanently identify each batch.
- D. Equipment shall be provided to continuously determine surface moisture in the fine aggregate. Moisture corrections shall be made without use of calculations by the batcher.
- E. The determination of the proportions of cement, aggregate, water and approved admixtures to attain the required strength shall be made by one of the following methods approved by the Architect. Under no circumstances shall Method II be used, when the established coefficient of variation is greater than 15.

F. Method I: Trial Mixtures

1. Requirements For General Use

| | |
|--|------|
| Min. 28 day compressive strength (psi) | 4000 |
| Max. size coarse aggregate (inches) | 1.0 |
| Min. cement content (lb. per cu. yd.) | 564 |
| Max. water-cement ratio | 0.50 |
| Max. slump (inches) | 5.0 |
| Min. slump (inches) | 3.0 |
| Air content (% by volume) +/- 1.0% | 4.5 |

- 2. Prior to delivery of concrete to job, Architect shall be furnished mix designs and at least ten consecutive test reports, made within the last six months, to substantiate strength-producing properties of the proposed mix design. If such data is not available, the mix design shall be certified by a recognized testing laboratory to produce specified results.

G. Method II: Field Experience

1. Requirements For General Use

| | |
|--|------|
| Min. 28 day compressive strength (psi) | 4000 |
| Max. size coarse aggregate (inches) | 1.0 |
| Max. slump (inches) | 5.0 |
| Min. slump (inches) | 3.0 |
| Air content (% by volume) +/- 1.0% | 4.5 |

- 2. Prior to delivery of concrete to job, the Architect shall be furnished a certified

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statement establishing the standard deviation of the plant. At least fifteen consecutive test reports based on the proposed mix design and made within the last six months shall be furnished the Architect to substantiate the strength-producing properties of the proposed mix design.

- H. No water may be added to any concrete.

3.2 CONVEYING AND DEPOSITING

- A. Concrete shall be conveyed and placed in accordance with ACI 304. It shall be deposited as early as practicable, in its final position. Methods used shall not cause separation of materials.
- B. Forms shall be free of ice, water and debris before concrete is placed.
- C. Only clean equipment, free of hardened concrete and foreign material, shall be used for conveyance.
- D. Placing shall proceed as continuous operation until unit of construction is complete.
- E. Concrete placed in forms shall be consolidated by mechanical vibration. Vibrator shall deliver 10,000 vibrations per minute and shall be inserted into each 18" lift at intervals not to exceed 12". Vibrator shall run for minimum of 8 seconds after complete submersion.

3.3 CURING AND PROTECTION

- A. Immediately after completion of final placing and/or finishing operation all concrete surfaces shall be protected from defacing of any nature and shall be maintained in moist condition for a period of five (5) days.
- B. Curing methods must be approved by the Architect before concreting is begun.
- C. Curing Methods: Perform curing of concrete by moist curing, by moisture-retaining cover curing, by curing compound, and by combinations thereof, as herein specified. Note: Do not use membrane curing compounds on surfaces which are to be covered with coating material applied directly to concrete (liquid floor hardener, waterproofing, damp-proofing, membrane roofing, flooring, painting, and other coatings and finish materials), unless otherwise acceptable to Architect, and written documentation is provided by coating manufacturer.
- D. Provide moisture curing by following methods:
 - 1. Keep concrete surface continuously wet by covering with water or continuous water-fog spray.

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2. Covering concrete surface with specified absorptive cover, thoroughly saturating cover with water and keeping continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4" lap over adjacent absorptive covers.
- E. Provide moisture-cover curing as follows: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3" and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
- F. Provide curing compound to slabs where indicated, or where permissible as described herein, as follows: Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours). Apply uniformly in continuous operation by power-spray or roller in accordance with manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during period.
1. Curing Formed Surfaces: Cure formed concrete surfaces, similar surfaces by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.
 2. Curing Unformed Surfaces: Cure unformed surfaces, such as slabs, floor topping, and other flat surfaces by application of appropriate curing compound.
- G. Final cure concrete surfaces to receive liquid floor hardener or finish flooring by use of moisture-retaining cover, unless otherwise directed.

3.4 COLD WEATHER REQUIREMENTS

- A. Temperature of concrete when placed shall be not less than 50 deg. F.
- B. Temperature of concrete shall be maintained above 50 deg. F. and below 90 deg. F. for duration of curing period.
- C. Procedures shall be in accordance with ACI 306. Concrete shall be placed within 90 minutes of batch time.

3.5 HOT WEATHER REQUIREMENTS

- A. Temperature of concrete when placed shall be less than 90 degrees F.

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- B. All concrete shall be placed within 90 minutes of batch time. Shorter time limits may apply when air temperature is in excess of 90 degrees F.
- C. Procedures shall be in accordance with ACI 305.

3.6 GENERAL FORMWORK

- A. Forms shall conform to shape, lines and dimensions of members as indicated, and shall be substantial and sufficiently tight to prevent leakage of mortar. They shall be properly braced or tied together so as to maintain position and shapes and insure safety to workmen or passersby. Forms for smooth exposed surfaces shall be constructed of Plywood or other approved smooth material. All plywood forms shall be new at the beginning of the job. Exposed concrete corners shall be beveled 3/4 inch unless otherwise noted.
- B. Form coatings, when required, shall be non-staining and shall be applied before reinforcing steel is placed. Temporary openings for cleaning and inspection shall be provided at base of vertical forms and other places when necessary.
- C. It is the intent of this specification that all form removal be done in such manner and at such time as to not damage the concrete surfaces and to insure complete safety to the structure. The contractor shall be responsible for safe practice in this regard.
- D. Design, installation, and removal of formwork shall conform to the requirements of ACI 347.

3.7 INSTALLATION OF ANCHORAGE ITEMS AND JOINTS

- A. Joints not shown in the contract documents shall be so made and located as to least impair the strength of the structure and shall be approved by the Architect/Engineer.
- B. All reinforcement shall be continued across joints. Keys shall be provided as directed by the Architect/Engineer.
- C. Anchor bolts furnished under Section 05 1200 shall be set in accordance with the setting plan furnished under Paragraph 1.03-B-4 of Section 05 1200.
- D. It shall be the responsibility of the contractor under this section to coordinate and place all cast-in-place anchorage items related to anchoring wall system. Anchorage items shall be located as shown on plans.
- E. Dovetail slots and other embedded items shall be provided as required for support of other work that is attached to or supported by cast-in-place concrete. Spacing of dovetail slots shall not exceed 24" on center.

3.8 REINFORCING

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- A. Detailing, fabrication and placing shall conform to ACI 315 and/or ACI 318.
- B. Shop drawings shall be checked by the contractor and submitted to the Architect for review in conformance with "Special Provisions" before fabrication is begun.

3.9 CONCRETE TESTING

- A. Test to determine quality of concrete will be paid for by the Owner.
- B. Each class of concrete shall be represented by at least five tests. Not less than one test shall be made each 50 cubic yards, but there shall be at least one test for each day's concreting unless otherwise directed by Architect. Laboratory shall record and report location within project of concrete tested.

- C. A test shall consist of the following:

- Selection and securing of samples A.S.T.M. C172
- Air content* A.S.T.M. C231 or A.S.T.M. C173
- Slump Test* A.S.T.M. C143
- Cylinders - Five - 6" x 12" A.S.T.M. C31
- Cylinder Test* A.S.T.M. C39
- *Results to be reported by laboratory on test reports.

- D. Two cylinders shall be tested at 7 days for information and two cylinders shall be tested at 28 days for acceptance. One cylinder shall be kept in reserve for 56-day test if needed. Reports of 7, 28, and 56 day strength tests shall be made directly by laboratory as follows:

- One copy to Owner
- Two copies to Architect
- One copy to Structural Engineer
- One copy to Contractor
- One copy to R/M Producer

- E. The strength level shall be considered satisfactory so long as the average of all sets of three (3) consecutive strength test results equal or exceed the specified f'c and no individual strength test result falls below the specified strength f'c by more than 500 psi.
- F. In event test results do not meet specification requirements; one or more of the following will be required at no cost to owner:
 - 1. Windsor Probe test conforming to A.S.T.M. C803
 - 2. Core-boring test conforming to A.S.T.M. C42
 - 3. Load test in accordance with Chapter 20, ACI 318-95

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- G. In event Windsor Probe, core-boring, or load test indicate that concrete does not conform to specifications, contractor shall take such measures as Architect shall prescribe or shall remove defective work as directed by Architect.
- H. Test made for contractor's convenience, to determine when concrete can be placed in service or stripped, shall be paid for by contractor. Such tests shall be made in accordance with A.S.T.M. C31 and cured in the field as directed by the Architect.

3.10 FINISHING HORIZONTAL SURFACES

- A. Under no circumstances shall dry cement or mixture of cement and sand be used to absorb surface moisture or to stiffen surface to be finished.
- B. The surface plane tolerance for cast slabs shall be such that depressions between high spots are not greater than 1/8" under a 10 foot straight-edge. For slabs on grade and shored elevated slabs, the overall floor flatness and levelness shall be not less than $F_f = 35$ and $F_L = 25$. Minimum local values shall be $F_f = 25$ and $F_L = 15$. For unshored elevated slabs, the overall floor flatness shall be not less than $F_f = 35$, with a minimum local value of $F_f = 25$.
- C. Concrete floor tolerances specified in paragraph B (above) shall be tested within 72 hours after floor installation. Testing procedures shall comply with ASTM E 1155 "Standard Test Method for Determining F_f Floor Flatness and F_L Floor Levelness Numbers". An independent testing laboratory will be retained by the Owner to provide floor tolerance testing.
- D. Finish of concrete surfaces shall be as indicated on the drawings and room finish schedule.
- E. Broom Finish: After concrete has been placed, surface shall be brought to established grade with straightedge and bull floated to "Smooth Out" surface. When water sheen has disappeared, surface shall be floated with power and/or wood floats. After floating, surface shall be broomed to achieve surface texture approved by Architect.
- F. Hard Trowel Finish: After concrete has been placed, surface shall be brought to established grade, with straightedge and bull floated to "Smooth Out" surface. When water sheen has disappeared, surface shall be finished with power-operated trowel and/or hand trowel until smooth hard surface is obtained free of pin holes and other imperfections.
- G. Curing Compound: Surfaces to be treated as indicated on plans or called for in room schedule shall be prepared and the curing compound shall be "roller applied only" in strict accordance with the manufacturer's recommendations and as specified herein.

Application of curing compound shall be deferred until all other work that might cause

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damage to the surface has been completed. The curing compound shall be applied in 2 coats so that minimum coverage is not more than 450 square feet per gallon of material per coat.

3.11 REPAIRING AND PATCHING

- A. Tie holes and repairable defective areas shall be patched immediately after form removal.
- B. Patching mixture shall be made of same material and of approximately same proportions as used for concrete, except that coarse aggregate shall be omitted and mortar shall consist of not more than one part cement to 2 1/2 parts sand by damp loose volume. White Portland cement shall be substituted for part of Gray Portland cement on exposed concrete in order to produce color matching color of surrounding concrete, as determined by trial patch. Remove all fins, form offset marks and other imperfections that would present an unsightly appearance.

3.12 FINISHING EXPOSED CONCRETE SURFACES

- A. Surfaces that will be exposed in the finished structure other than those under 3.10 shall have fins removed and repairable defective areas patched. Rubbing of the surfaces will be required. See Paragraph 3.6 for formwork requirements. Patching procedures shall be as specified in paragraph 3.11 of this Section.

(SEE EXHIBIT "A" NEXT PAGE)

END OF SECTION 033000

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EXHIBIT "A"

PROJECT NAME: _____

PROJECT LOCATION: _____

GENERAL CONTRACTOR: _____

CONCRETE SUPPLIER: _____

ADDRESS: _____

TYPE PLANT: CENTRAL MIX () TRANSIT MIX ()
AUTOMATIC () SEMIAUTOMATIC () MANUAL ()

ESTIMATED HAUL DISTANCE: _____ MILES

ESTIMATED HAUL TIME: _____ MINUTES

CEMENT SOURCE: _____

F. A. SOURCE: _____

C. A. SOURCE: _____

DATE SCALES LAST TESTED: _____

METHOD OF PROPORTIONING MIX: PRESCRIPTION () PERFORMANCE ()

CONCRETE TESTING:

NAME OF LAB: _____

ADDRESS OF LAB: _____

HAS LAB PERSONNEL READ CONCRETE SPECIFICATION? YES () NO ()

WHO WILL MOLD CYLINDERS AND PERFORM OTHER SPECIFIED TESTS?
CONTRACTOR PERSONNEL () TESTING LAB PERSONNEL ()

IF BY CONTRACTOR PERSONNEL, IS PERSON FAMILIAR WITH SPECIFIED
A.S.T.M. REQUIREMENTS FOR TEST? YES () NO ()

TEST CYLINDERS WILL BE TRANSPORTED FROM FIELD TO LABORATORY BY:
CONTRACTOR () TESTING LABORATORY () OTHER ()

IF BY OTHER ... NAME _____
(GENERAL CONTRACTOR)

CAST-IN-PLACE CONCRETE

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SECTION 033001 – CAST-IN-PLACE CONCRETE FOR BRIDGE STRUCTURES AND SLABS

PART 1 - GENERAL

1.1 STANDARDS

- A. Follow the requirements of the Kentucky Transportation Cabinet Standard Specifications for Road and Bridge Construction, current edition, Sections 601, 608, and 609 with the following exceptions:
 - 1. 21st Century Parks, Inc. will provide independent materials testing through a Certified Construction Inspection Engineer with certified technicians and laboratory. The Contractor is responsible to coordinate the Work and schedule inspections and testing with the Inspection Engineer.
 - 2. See Section 033002 for specifications for placing mass concrete at bridge anchor pads and anchor blocks.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Follow the requirements of the Kentucky Transportation Cabinet Standard Specifications for Road and Bridge Construction, current edition, Division and Sections 601, 608, and 609.

PART 3 - EXECUTION

3.1 PREPARATION, STORAGE, AND EXCAVATION

- A. Follow the requirements of the Kentucky Transportation Cabinet Standard Specifications for Road and Bridge Construction, current edition, Division and Sections 601, 608, and 609.

END OF SECTION 033001

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SECTION 033002 – MASS CONCRETE FOR BRIDGE STRUCTURES

PART 1 - GENERAL

1.1 DEFINITION

- A. Mass concrete shall include bridge anchor pads and anchor blocks.

1.2 STANDARDS

- A. Follow the requirements of the Kentucky Transportation Cabinet Standard Specifications for Road and Bridge Construction, current edition, Sections 601, 608, and 609.

1.3 ACTION SUBMITTALS

- A. Submit a thermal control plan with design calculations for each mass concrete element. Determine the maximum allowable temperature differential assuming cracking due to heat of hydration must not occur. The thermal control plan and the calculations must be sealed and signed by an engineer who is registered as a civil engineer in the State. Submit 4 copies of the control plan and 2 copies of the design calculations. Include the following:
 - 1. Mix design.
 - 2. Duration and method of curing.
 - 3. Maximum allowable temperature differentials between the hottest point of the concrete and the exterior concrete faces.
 - 4. Procedures to control concrete temperature differentials at time of placement.
 - 5. Methods of controlling temperature differentials.
 - 6. Temperature differential monitoring and recording system details.
 - 7. Temperature sensor types and locations.
 - 8. Measures to ensure compliance with maximum temperature and temperature differential requirements.

- B. Submit a modified thermal control plan to correct deficiencies for replacement mass concrete. Include supporting calculations.

1.4 INFORMATIONAL SUBMITTALS

- A. Submit temperature data daily.
- B. Submit a daily progress report. A copy of the daily report must be available at the job site.

1.5 QUALITY CONTROL AND ASSURANCE

- A. An engineer who is registered as a civil engineer in the State must:
 - 1. Inspect and test the temperature monitoring and recording systems before concrete placement.
 - 2. Be present during mass concrete activities.

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3. Provide daily progress reports.
- B. Provide a temperature monitoring and recording system for mass concrete elements. The system must consist of temperature sensors connected to a data acquisition system. The system must be capable of recording, printing, and downloading temperature data to a computer.
- C. Locate temperature sensors within mass concrete elements such that the maximum temperature difference within the element is monitored. At a minimum, monitor temperatures at the following locations:
 1. Calculated hottest location.
 2. 2 outer faces.
 3. 2 corners.
 4. Top surfaces.
- D. Record temperature readings automatically at least every hour. Install a redundant set of sensors near the primary set with recording capability. Make records using the redundant set if the primary set fails.
- E. Hourly temperature recording may be discontinued under the following conditions:
 1. Maximum internal temperature is falling.
 2. Difference between the interior concrete temperature and the average daily air temperature is less than the allowable temperature differential for 3 consecutive days.
 3. There are no mass concrete elements to be cast adjacent.
- F. Protect the temperature sensor wiring to prevent movement during concrete placement. Keep wire runs as short as possible. Do not let the ends of temperature sensors come into contact with concrete supports, forms, or reinforcement.
- G. Do not damage the monitoring and recording system when placing and consolidating concrete.
- H. Correct equipment failures in temperature control and monitoring and recording systems immediately.
- I. The temperature acceptance criteria for mass concrete elements are as follows:
 1. Maximum allowable temperature must not exceed 160 degrees F.
 2. Maximum temperature differential must not exceed that listed in the thermal control plan.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Follow the requirements of the Kentucky Transportation Cabinet Standard Specifications for Road and Bridge Construction, current edition, Division and Sections 601, 608, and 609.

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PART 3 - EXECUTION

3.1 PREPARATION, STORAGE, AND EXCAVATION

- A. Follow the requirements of the Kentucky Transportation Cabinet Standard Specifications for Road and Bridge Construction, current edition, Division and Sections 601, 608, and 609.

3.2 CONSTRUCTION

- A. Mechanical cooling systems may be used to control internal concrete temperatures during curing. Mechanical cooling systems must comply with the thermal control plan.
- B. Embed the system within mass concrete elements. Surface connections to cooling pipes must be removable to 4 inches below the concrete surface.
- C. Design the forms such that cooling or temperature monitoring is not disturbed during form removal.
- D. Secure the cooling pipes to prevent movement during concrete placement. Replace damaged cooling pipes immediately.
- E. Pressure test the cooling system for leaks at 30 psi for 30 minutes before placing concrete. Coolant must be circulating when concrete placement starts.
- F. Pressure grout the cooling pipes after cooling is complete. Use a nonshrink grout mix complying with ASTM C 1107 and ASTM C 827 for 0.0 percent shrinkage and 0.0 percent minimum and 4.0 percent maximum expansion. Place the grout under the manufacturer's instructions.
- G. After the surface connections are removed, the holes must be reamed and filled with mortar.
- H. Remove mass concrete elements that do not comply with the temperature acceptance criteria.

END OF SECTION 033002

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SECTION 033300 - ARCHITECTURAL CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes cast-in-place architectural concrete surfaces for Trailheads, Seat Walls, and Site Retaining Walls: including board form facings, smooth form facings, reinforcement accessories, concrete materials, color pigments, concrete mixture design, placement procedures, and finishes.
- B. Related Requirements:
 - 1. Section 033000 "Cast-In-Place Concrete" for formwork, material, fabrication and installation requirement, for steel reinforcement and field quality control.
 - 2. Section 071900 "Water Repellents" for film-forming coatings on exposed concrete surfaces.
 - 3. Section 079200 "Joint Sealants" for elastomeric joint sealants in contraction and other joints in cast-in-place architectural concrete.

1.3 DEFINITIONS

- A. Cast-in-Place Architectural Concrete: Formed concrete that is exposed to view on surfaces of completed structure or building and that requires special concrete materials, formwork, placement, or finishes to obtain specified architectural appearance.
- B. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.
- C. Design Reference Sample: Sample designated by Architect in the Contract Documents that reflects acceptable surface quality and appearance of cast-in-place architectural concrete.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

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- C. Samples: For each of the following materials:
 - 1. Wood Form-facing panel.
 - 2. Form ties.
 - 3. Chamfers and rustications.

- D. Samples for Verification: Architectural concrete Samples, cast vertically, approximately 18 by 18 by 2 inches, of finishes, colors, and textures to match design reference sample. Include Sample sets showing the full range of variations expected in these characteristics.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer.

- B. Material Certificates: For each of the following:
 - 1. Cementitious materials.
 - 2. Admixtures.
 - 3. Form materials and form-release agents.
 - 4. Repair materials.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "NRMCA Quality Control Manual - Section 3, Certification of Ready Mixed Concrete Production Facilities."

- B. Testing Agency Qualifications: Qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.
 - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.
 - 2. Personnel performing laboratory tests shall be an ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.

- C. Source Limitations for Cast-in-Place Architectural Concrete: Obtain each color, size, type, and variety of concrete material and concrete mixture from single manufacturer with resources to provide cast-in-place architectural concrete of consistent quality in appearance and physical properties.

- D. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

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1. ACI 301, "Specification for Structural Concrete," Sections 1 through 5 and Section 6, "Architectural Concrete."
 2. ACI 303.1, "Specification for Cast-in-Place Architectural Concrete."
- E. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.
- F. Mockups: Before casting architectural concrete, build mockups to verify selections made under Sample submittals and to demonstrate typical joints, surface finish, texture, tolerances, and standard of workmanship. Build mockups to comply with the following requirements, using materials indicated for the completed Work:
1. Build mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
 2. Build mockups of typical exterior wall of cast-in-place architectural concrete as shown on Drawings.
 3. Demonstrate curing, cleaning, and protecting of cast-in-place architectural concrete, finishes, and contraction joints, as applicable.
 4. Construct mock-up of proposed board-faced formwork, including corner to demonstrate surface tolerances and standard of workmanship.
 5. Obtain Architect's approval of mockups before casting architectural concrete.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

- A. General: Comply with Section 033000 "Cast-in-Place Concrete" for formwork and other form-facing material requirements.
- B. Board-Form Panels for As-Cast Finishes: Horizontal 1 x 6 rough-sawn cedar to match spacing, texture, and finish of existing work on Comfort Station at the Creekside Center. See architectural drawings for finish location.
- C. Smooth Form-Facing Panels for As-Cast Finishes: Steel, glass-fiber-reinforced plastic, or other approved nonabsorptive panel materials that will provide continuous, true, and smooth architectural concrete surfaces. Furnish in largest practicable sizes to minimize number of joints. See architectural drawings for finish location.
- D. Furnish in largest practicable sizes to minimize number of joints. Stagger vertical joints.
- E. Miter inside corners of boards.
- F. Furnish with manufacturer's recommended liquid-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent surface treatments of concrete.

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- G. Chamfer Strips: Metal, rigid plastic, elastomeric rubber, or dressed wood, 3/4 by 3/4 inch, minimum; nonstaining; in longest practicable lengths.
- H. Form Joint Tape: Compressible foam tape; pressure sensitive; AAMA 800, "Specification 810.1, Expanded Cellular Glazing Tape"; minimum 1/4 inch thick.
- I. Form Joint Sealant: Elastomeric sealant complying with ASTM C 920, Type M or Type S, Grade NS, that adheres to form joint substrates.
- J. Sealer: Penetrating, clear, polyurethane wood form sealer formulated to reduce absorption of bleed water and prevent migration of set-retarding chemicals from wood. See Section 071900 for more details.
- K. Form-Release Agent: Commercially formulated, colorless form-release agent that will not bond with, stain, or adversely affect architectural concrete surfaces and will not impair subsequent treatments of those surfaces.
 - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- L. Form Ties: Factory-fabricated, glass-fiber-reinforced plastic ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

2.2 STEEL REINFORCEMENT AND ACCESSORIES

- A. General: Comply with Section 033000 "Cast-in-Place Concrete" for steel reinforcement and other requirements for reinforcement accessories.
- B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire fabric in place; manufacture according to CRSI's "Manual of Standard Practice." Supports should not contact formwork.

2.3 CONCRETE MATERIALS

- A. General: Comply with Division 03 Section "Cast-in-Place Concrete" for materials and admixtures.
- B. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
 - 1. Portland Cement: ASTM C 150, Type I,
- C. Normal-Weight Aggregates: ASTM C 33, Class 5M coarse aggregate or better, graded. Provide aggregates from single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.
 - 1. Maximum Coarse-Aggregate Size: 1/2 inch.
 - 2. Gradation: Uniformly graded.

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- D. Normal-Weight Fine Aggregate: ASTM C 33, manufactured or natural sand, from same source for entire Project.
- E. Water: Potable, complying with ASTM C 94/C 94M except free of wash water from mixer washout operations.

2.4 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C 260.
- B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
- C. Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black, nonfading, and resistant to lime and other alkalis.
 - 1. Color: Grace Hydrotint “Pebble” to match Comfort Station at Creekside Center.

2.5 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.
 - 1. For integrally colored concrete, curing compound shall be pigmented type approved by color pigment manufacturer.
 - 2. For concrete indicated to be sealed, curing compound shall be compatible with sealer.

2.6 REPAIR MATERIALS

- A. Bonding Agent: ASTM C 1059/C 1059M, Type II, nonredispersible, acrylic emulsion or styrene butadiene.
- B. Epoxy Bonding Adhesive: ASTM C 881/C 881M, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements.
 - 1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

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2.7 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of cast-in-place architectural concrete proportioned on basis of laboratory trial mixture or field test data, or both, according to ACI 301.
 - 1. Comply with Division 03 Section "Cast-In-Place Concrete" for concrete mixes.
- B. Cementitious Materials: For cast-in-place architectural concrete exposed to deicers, limit percentage, by weight, of cementitious materials other than portland cement according to ACI 301 requirements.
- C. Admixtures: Use admixtures according to manufacturer's written instructions.
- D. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

2.8 CONCRETE MIXING

- A. Ready-Mixed Architectural Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and furnish batch ticket information.
 - 1. Clean equipment used to mix and deliver cast-in-place architectural concrete to prevent contamination from other concrete.
 - 2. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK

- A. General: Comply with Section 033000 "Cast-in-Place Concrete" for formwork, embedded items, and shoring and reshoring.
- B. Limit deflection of form-facing panels to not exceed ACI 303.1 requirements.
- C. Fabricate forms to result in cast-in-place architectural concrete that complies with ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
- D. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast-in-place surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical. Kerf wood rustications, keyways, reglets, recesses, and the like, for easy removal.
 - 1. Seal form joints and penetrations at form ties with form joint tape or form joint sealant to prevent cement paste leakage.

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- E. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- F. Do not chamfer exterior corners and edges of cast-in-place architectural concrete.
- G. Coat contact surfaces of wood boards and chamfer strips with sealer before placing reinforcement, anchoring devices, and embedded items.
- H. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- I. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- J. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- K. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.
- L. Erect board forms accurately to provide finished surface texture indicated. Provide solid backing and attach securely to prevent deflection and maintain stability of liners during concreting. Prevent boards from sagging and stretching in hot weather. Seal joints of forms and accessories to prevent mortar leaks. Coat forms with form-release agent.

3.2 REINFORCEMENT AND INSERTS

- A. General: Comply with Section 033000 "Cast-in-Place Concrete" for fabricating and installing steel reinforcement. Securely fasten steel reinforcement and wire ties against shifting during concrete placement.
- B. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

3.3 REMOVING FORMS

- A. Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.
 - 1. Schedule form removal to maintain surface appearance that matches approved mockups.
 - 2. Cut off and grind glass-fiber-reinforced plastic form ties flush with surface of concrete. Do not damage finished surface.

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3.4 JOINTS

- A. Construction Joints: Install construction joints true to line with faces perpendicular to surface plane of cast-in-place architectural concrete so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated.
 - 2. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
 - 3. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
 - 4. Use bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- B. Contraction Joints: Form weakened-plane contraction joints true to line with faces perpendicular to surface plane of cast-in-place architectural concrete so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

3.5 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, form-release agent, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.
- C. Deposit concrete continuously between construction joints. Deposit concrete to avoid segregation.
 - 1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
 - 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 303.1.
 - 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. Do not permit vibrators to contact forms.
- D. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
 - 1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.

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2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents.
4. Do not use chemical accelerators unless otherwise specified and approved in design mixtures.

E. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.6 FINISHES, GENERAL

- A. Architectural Concrete Finish: Match Architect's design reference sample, identified and described as indicated, to satisfaction of Architect.
- B. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces.
 1. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.
- C. Maintain uniformity of special finishes over construction joints unless otherwise indicated.

3.7 AS-CAST FORMED FINISHES

- A. Rough-Formed (Board-Form) Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections exceeding specified limits on formed-surface irregularities and as directed by Architect.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Remove fins and other projections exceeding specified limits on formed-surface irregularities. Repair and patch tie holes and defects.

3.8 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with ACI 301 for hot-weather protection during curing.

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- B. Begin curing cast-in-place architectural concrete immediately after removing forms from concrete. Cure according to ACI 308.1, by one or a combination of the following methods that will not mottle, discolor, or stain concrete:
 - 1. Moisture Curing: Keep exposed surfaces of cast-in-place architectural concrete continuously moist for no fewer than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for no fewer than seven days. Immediately repair any holes or tears during curing period; use cover material and waterproof tape.
 - 3. Curing Compound: Mist concrete surfaces with water. Apply curing compound uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.9 FIELD QUALITY CONTROL

- A. General: Comply with field quality-control requirements in Section 033000 "Cast-in-Place Concrete."

3.10 REPAIRS, PROTECTION, AND CLEANING

- A. Repair and cure damaged finished surfaces of cast-in-place architectural concrete when approved by Architect. Match repairs to color, texture, and uniformity of surrounding surfaces and to repairs on approved mockups.
 - 1. Remove and replace cast-in-place architectural concrete that cannot be repaired and cured to Architect's approval.
- B. Protect corners, edges, and surfaces of cast-in-place architectural concrete from damage; use guards and barricades.
- C. Protect cast-in-place architectural concrete from staining, laitance, and contamination during remainder of construction period.
- D. Clean cast-in-place architectural concrete surfaces after finish treatment to remove stains, markings, dust, and debris.
- E. Wash and rinse surfaces according to concrete finish applicator's written instructions. Protect other Work from staining or damage due to cleaning operations.

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1. Do not use cleaning materials or processes that could change the appearance of cast-in-place architectural concrete finishes.

END OF SECTION 033300

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SECTION 044200 - EXTERIOR STONE CLADDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Kentucky Department of Transportation Standard Specifications for Road and Bridge Construction, current edition; 2007 AASHTO LRFD Bridge Design Specifications, 4th Edition, with interims through 2009; 2010 AASHTO LRFD Bridge Construction Specifications, 3rd Edition; ASTM C-568, Standard Specification for Limestone Building Stone; ASTM C-97, Test Methods for Absorption and Bulk Specific Gravity of Building Stones; ASTM C-99, Test Method for Modulus of Rupture of Building Stone; ASTM C-170, Test Method for Compressive Strength of Building Stone; Indiana Limestone Handbook, latest edition; Contractors Handbook on Indiana Limestone, latest edition; ILI Technote on Safety Factors; and other applicable ILI Technotes.

1.2 SUMMARY

- A. Section Includes:
 - 1. Extent of limestone work is indicated on bridge plans for Bridges F-403, F-404, F-411, and other miscellaneous wall structures specified to receive stone cladding.
- B. General: Provide Indiana Limestone cladding in accordance with the contract documents. The Work shall include the following:
 - 1. Large course roughback finish variegated limestone blocks.
 - 2. Large course smooth finish variegated limestone blocks and capstone.
 - 3. Steel support and retention connections for stonework, including necessary shims.
 - 4. Secondary structural steel framing for stonework where not shown or not sized on structural drawings.
 - 5. Mock-ups.
 - 6. Installation of stonework.
- C. Installation of preset or field drilled concrete inserts.

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1.3 SYSTEM DESCRIPTION

- A. General: Design, fabricate, and install stonework to withstand normal loads from wind, gravity, movement of bridge structure, flooding and debris impact, and thermally induced movement, as well as to resist deterioration under conditions of normal use including exposure to weather and water, without failure.
- B. Performance Requirements- General: The cladding requirements shown by the general stone details are intended to establish basic dimensions of units or modules, plus profiles and sight lines for the stonework. Within these limitations, the contractor shall be responsible for the design of the stonework, and shall request approval of, and make whatever modifications and additions to the details as may be required to fulfill the performance requirements. The visual concept shall be maintained as shown, including profiles and alignment of components.
- C. The requirements for the stone support and anchorage as shown by the details are intended to establish the basic intent of the stone anchorage system. The contractor shall be responsible for the design of the support and anchorage system and shall request approval of, and make whatever modifications and additions to the details as may be required to fulfill the performance requirements. Final shapes and locations shall be as designed by a registered professional engineer.
- D. Engineering Calculations: This engineer shall be a registered professional engineer experienced in cladding design to design the cladding support and retention system. The system shall include all items required to connect the stone cladding to the structure (or secondary framing) as shown and detailed on the structural drawings. The cladding engineer shall be registered in the state of Kentucky and shall prepare engineering calculations for the justification of all principal stonework, units, fasteners, and anchorage components for compliance with the criteria established in the performance requirements of this section. The calculations shall be submitted to the 21st Century Parks, Inc. design team for review and approval. After review, revisions, and final copy of the calculations with professional engineer's stamp or seal. Based on the design loads, material properties, and safety factors (all as defined in this section), the calculations shall include, as a minimum, the following information.
 - 1. Stone loads, stresses, and safety factors.
 - 2. Support and anchorage loads, stresses, safety factors, design loads, and allowable loads.
 - 3. Stone thicknesses.
 - 4. Support and anchorage sizes.
 - 5. Drawings of all support and anchorage items in sufficient detail for fabrication and for the detailing and completion of the shop drawings as prepared by the

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stone fabricator. The cladding engineer shall review all stone shop drawings prepared by stone installer or fabricator.

1.4 PERFORMANCE REQUIREMENTS - STONE

- A. Physical Properties: The Indiana Limestone physical properties shall meet or exceed the values listed in the Indiana Limestone Institute of America, Inc. Handbook (ILIA), latest edition.
- B. Connections and Attachments for Limestone: Support and Retention Steel: All steel shapes, plated and straps shall be designed to carry the design loads with safety factors and allowable stresses in accordance with the American Institute of Steel Construction, Inc. (AISC) except that steel supports carrying gravity loads shall be stressed no more than 50% of the yield stress in bending.
- C. Connections into the Stone: Expansion bolts, straps, hooks, anchors, and other devices shall be designed to carry the design loads with safety factors not less than listed in ILIA Technote on Safety Factors.
- D. Attachments to the Structure: Connections and attachments to the structure or secondary framing shall be designed to carry the design loads with safety factors or allowable stresses in accordance with the following:
 - 1. Welds: Structural Welding Code (AWS D1.1 and AISC)
 - 2. Expansion Bolts: Per ICBO evaluation report for the specific bolt to be used. If an ICBO report is not available, use not less than the following:
 - a. Safety Factors: Into 4000 psi concrete – 4 to 1
 - b. The combined load factor for combined tension and shear shall satisfy the ILIA Technote on Safety Factors.
 - 3. Bolts: AISC
 - 4. Concrete Embedded (Cast-in) items: PCI or manufacturer's recommendations, whichever is more conservative. The safety factor shall be not less than 4 to 1 based on concrete failure.
 - 5. Design Loads: All cladding and cladding attachments shall be designed to carry the following design loads with safety factors not less than specified in the Section.
 - 6. Wind Loads: (Latest Edition) UBC (or applicable code or wind tunnel test results).
 - 7. Seismic Loads: Per code where applicable.
 - 8. Vertical Loads:
 - a. Dead Loads: Actual computed weight of cladding.
 - b. Live Loads: 2007 Kentucky Building Code
 - 9. Stream Pressure (Flooding) and Debris Loads: Per 2007 AASHTO LRFD Bridge Design Specifications, 4th Edition, with interims through 2009.

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10. Provisions for Fabrication and Erection Tolerances: Design, detail, and fabricate connections to provide allowance for fabrication tolerances, erection tolerances, and structural deflections.
 - a. Concrete structural fabrication and erection tolerances are specified in the KDOH Standard Specifications for Road and Bridge Construction.
 - b. Structural Steel fabrication and erection tolerances are specified in KDOH Standard Specifications for Road and Bridge Construction.
11. Control of Corrosion: Prevent galvanic and other forms of corrosion by insulating metals and other materials from direct contact with non-compatible materials, or by suitable coating.

1.5 SUBMITTALS

- A. Product Data: Submit manufacturer's technical data for all stone, stonework accessories, and other manufactured products required.
- B. Shop Drawings: Submit cutting and setting drawings indicating sizes, dimensions, sections, and profiles of stones; arrangement and provisions for jointing, supporting, anchoring, and bonding stonework; and details showing relationship with, attachment to, and reception or, related work. The drawings shall include the details as developed by the cladding engineer as defined in the performance requirements section.
- C. Stone Samples for Verification: Sets for each variety, color, and finish of stone required; not less than 12 inches (300 mm) square.
 1. Sets shall consist of at least three samples, exhibiting extremes of the full range of color and other visual characteristics expected and will establish the standard by which stone will be judged. Size to be a minimum of 8"x2'-0"x6'-0" and may be made available at the quarry or fabricator's place of business for the design team to review.
 2. Grout or mortar samples for each type and color of joint grout or mortar required.
- D. Data for Limestone cladding: For limestone cladding, submit the following data which has been signed and stamped by a qualified professional engineer registered in Kentucky who thereby certifies preparing or supervising the preparation of the data to comply with the performance requirements and recognized engineering principles and practices.
 1. Engineering calculations as defined in the performance section.
 2. Connection details as defined in the performance section.

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1.6 QUALITY ASSURANCE

- A. Single Source Responsibility for Stone: Obtain limestone from a single quarry source with resources to provide materials of specified consistent quality. The fabricator and the quarry shall have sufficient capacity to quarry, cut, and deliver the stonework on schedule. Both fabricator and quarry must be members in good standing of Indiana Limestone Institute.
- B. Single Source Responsibility for Mortar Materials: Obtain mortar ingredients of uniform quality and from one manufacturer for each cementitious and admixture component and from one source or producer for each aggregate.
- C. Single Source Responsibility for Grout Materials: Obtain grout ingredients of uniform quality and from one manufacturer for each cementitious and admixture component and from one source or producer for each aggregate.
- D. Single Source Responsibility for Other Materials: Obtain each type of stone accessory, sealants, and other materials from one manufacturer for each product.
- E. Information on Drawings and in Specifications establishes requirements for both aesthetic effects and performance of the limestone cladding. Aesthetic effects are indicated by dimensions, arrangement, alignment and profiles of components and assemblies as they relate to sight lines and relationships to one another and to adjoining work. Performance is indicated by criteria that is subject to verification by either preconstruction or field test, if applicable, or by in-service experience
 - 1. Do not modify intended aesthetic effects, as judged solely by the design team, except with design team's approval and only to the extent exclusively needed to comply with performance requirements. Where modifications are proposed, submit comprehensive explanatory data to the design team for review and approval.
- F. Installer Qualifications: Engage an installer with not less than 10 years experience and who has successfully completed stonework similar in material, design and extent to that indicated for this project. Submit list of completed projects; include project names, addresses, and names of architects and owners.
- G. Preconstruction Tests: Contractor shall obtain material tests as noted below
 - 1. Preconstruction Testing Service: Contractor shall employ and pay qualified independent testing laboratories to perform preconstruction testing indicated.
 - 2. Test limestone for compliance with physical property requirements for Limestone Building Stone, Type II, as listed in ASTM C-568. Conduct tests using specimens randomly selected from, and representative of, actual materials proposed for incorporation in the work.

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3. The following test reports shall be submitted:
 - a. ASTM C 99 Modulus of Rupture.

 - H. Field-Constructed Mockup: Prepare mockups for the stonework if applicable. Purpose of mockups is further verification of selections made for color and finish under sample submittals and establishing standard of quality for aesthetic effects expected in completed work. Build mockups to comply with following requirements:
 1. Locate mockups on site where indicated or, if not indicated, as directed by the Engineer.
 2. Build mockups containing elements typical of the stonework in this project. The extent of the mockup shall be defined by this section.
 3. Erect mockups only after notifying the design team when construction will begin.
 4. Regain mockups during construction as standard for judging completed stonework. When directed, de-molish mockups and remove from site.
 5. Option: Acceptable mockup may be incorporated into the work.

 - I. Qualifications for Welding Work: Qualify welding operators in accordance with AWS "Standard Qualification Procedure."
 1. Provide certification that each welder employed in the work is qualified for welding processes involved by having satisfactorily passed AWS qualification tests and, if applicable, by undergoing recertification. Retesting for recertification shall be contractor's responsibility
- 1.7 DELIVERY, STORAGE AND HANDLING
- A. Deliver masonry materials to project in undamaged condition.

 - B. Store and handle stone and related materials to prevent their deterioration or damage:
 1. Do not use pinch or wrecking bars on stonework.
 2. Lift with wide-belt type slings where possible; do not use wire rope or ropes containing tar or other sub-stances which might cause staining.
 3. Store stone on non-staining wood skids or pallets, covered with non-staining, waterproof membrane. Place and stack skids and stone to distribute weight evenly and to prevent breakage or cracking of stones.
 4. Store cementitious materials off the ground, undercover and in dry location.
- 1.8 PROJECT CONDITIONS
- A. Protect stonework during erection as follows:

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1. Lift stone with wide-belt slings; do not use wire rope or ropes that might cause staining. Move stone, if required, using dollies with cushioned wood supports.
 2. Store stone on wood skids or pallets with nonstaining, waterproof covers. Arrange to distribute weight evenly and to prevent damage to stone. Ventilate under covers to prevent condensation.
- B. Mark stone units, on surface that will be concealed after installation, with designations used on Shop Drawings to identify individual stone units. Orient markings on vertical panels so that they are right side up when units are installed.
- C. Deliver sealants to Project site in original unopened containers labeled with manufacturer's name, product name and designation, color, expiration period, pot life, curing time, and mixing instructions for multi-component materials.
- D. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- E. Store aggregates in locations where grading and other required characteristics can be maintained and where contamination can be avoided.

1.9 FIELD CONDITIONS

- A. Protect dimension stone cladding during erection by doing the following:
1. Cover tops of dimension stone cladding installation with nonstaining, waterproof sheeting at end of each day's work. Cover partially completed structures when work is not in progress. Extend cover a minimum of 24 inches (600 mm) down both sides and hold securely in place.
 2. Prevent staining of stone from mortar, grout, sealants, and other sources. Immediately remove such materials without damaging stone.
 3. Protect base of walls from rain-splashed mud and mortar splatter by coverings spread on ground and over wall surface.
 4. Protect sills, ledges, and projections from mortar and sealant droppings.
- B. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Remove and replace dimension stone cladding damaged by frost or freezing conditions. Comply with cold-weather construction and protection requirements for masonry contained in ACI 530.1/ASCE 6/TMS 602.
1. Remove ice or snow formed on stonework beds by carefully applying heat until top surface is dry to the touch.
 2. Remove stonework damaged by freezing conditions.
 3. Perform the following construction procedures while stonework is progressing. Temperature ranges indicated apply to air temperatures existing at time of installations.

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- a. In heating mortar materials, maintain mixing temperatures selected within 10 degrees F (6 degrees C); do not heat water for mortar to above 160 degrees F (71degrees C).
- b. Mortar: At 40 degrees F (4.4 degrees C) and below, produce mortar temperatures between 40 degrees F (4.4 degrees C) and 120 degrees F (49 degrees C) by heating mixing water and, at temperatures of 32 degrees F (0 degrees C) and below, sand as well. Always maintain temperature of mortar on boards above freezing
- c. At 25 degrees F (-4 degrees C) to 20 degrees F (-7 degrees C), heat both sides of walls under construction using salamanders or other heat sources and use windbreaks or enclosures when wind is in excess of 15 mph.
- d. At 20 degrees F (-7 degrees C) and below, provide enclosure and auxiliary heat to maintain an air temperature of at least 40 degrees F (4.4 degrees C) for 24 hours after setting stonework and heat stones so that they are above 20 degrees F (-7 degrees C) at time of installation

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Comply with referenced standards and other requirements indicated applicable to each type of material required.
- B. Provide stone from a single quarry for each grade, color, and finish of stone required.
- C. Make quarried blocks available for inspection by the design team.

2.2 LIMESTONE

- A. Limestone Building Stone Standard: ASTM C 568.
 1. Classification: Category II (Medium Density.)
 2. Variety: Indiana Limestone
- B. Finish of Exterior Limestone Cladding: As follows:
 1. Finish Indiana Limestone cladding to match standard finish of Indiana Limestone Institute, Inc. designated below
 - a. Large course roughback finish, as shown on the plans, and
 - b. Large course smooth finish, as shown on the plans.
 - c. Finish Indiana Limestone to match approved samples and/or mockups.

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- C. Furnish Stone in accordance with approved samples and jobsite mockup for type, variety, grade (if applicable), color, and other characteristics relating to aesthetic effects.
- D. Indiana Limestone Grade and Color: Provide color indicated below in accordance with grade and color classification established by Indiana Limestone Institute, Inc. (ILI).
 - 1. Standard grade will full variegated color blend.

2.3 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150, Type I except Type III may be used for cold weather construction. Provide gray or white cement as needed to produce mortar color required.
- B. Hydrated Lime: ASTM C 207. Type S.
- C. 2.3.3 Aggregate: ASTM C 144; and as indicated below Varieties and Sources: Subject to compliance with requirements, provide the following:
 - 1. For joints narrower than $\frac{1}{4}$ ", use aggregate graded with 100 percent passing the No. 8 sieve and 95 percent the No. 16 sieve.
- D. Water: Clean, non-alkaline and potable.

2.4 ANCHORS AND FASTENERS

- A. Provide anchors and attachments of type and size required to support the stonework fabricated from the following metals for conditions indicated below.
 - 1. Stainless steel, AISI Type 304 or 316, for anchors and expansion bolts embedded within the stone.
 - 2. Hot-Dip Galvanized Steel as follows:
 - Galvanized malleable iron for adjustable inserts embedded in the concrete structure. For anchor bolts, nuts and washers not in direct contact with stone; comply with ASTM A 307, Grade A, for material and ASTM C 153, Class C, for galvanizing."
 - For steel plates, shapes and bars not in direct contact with stone; comply with ASTM A 36 for materials and ASTM A 123 for galvanizing.
 - For expansion bolts not in direct contact with stone use zinc plated or cadmium plated bolts with stainless steel expansion clips.
 - For steel angles supporting limestone, if required; comply with ASTM A 36 for

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materials and ASTM A 123 for galvanizing. Supports protected with one shop coat of zinc-rich or other rust-inhibiting paint, and one job coat of similar, compatible paint, may be used at the discretion of the design team

- B. Dovetail slots: Where required, furnish dovetail slots, with filler strips, of slot size required to receive anchors provided, fabricated from 0.0336 (22-gage) galvanized sheet steel complying with ASTM A446, G90.

2.5 PREASSEMBLED UNITS – INDIANA LIMESTONE

- A. Performance Requirements: Performance requirements defined elsewhere in this section apply to the preassembled units.

- 1. The adhesive shall be a two-component epoxy consisting of epoxy resin and hardener.
- 2. Adhesive Properties: The adhesive used shall meet the following minimum requirements after a 7-day cure at 75 degrees Fahrenheit USING THE Property Value Test Method:

- a. Tensile Bond Cohesive ASTM C-321 Strength* failure in stone.
- b. Tensile elongation: 2.5% ASTM D-638.
- c. Tensile Strength: 3,500psi ASTM D-638
- d. Compressive Double Shear*: 400 psi MMM G-650A
- e. Compressive Strength: 6,000 psi ASTM D-695
- f. Shore "D" Hardness: 75 ASTM D-1706
- g. Water Absorption (24 hours): 0.50% ASTM D-570

*Note: These tests represent bond strength. Other tests are made on the adhesive only.

- B. Samples: Two sample units of stone bonded together with adhesive shall be submitted showing stone and joint quality. Samples shall be 6" long, 3" wide, ¾-inch thick, bonded together on the large face, at right angles. No fabrication or assembly shall begin until approval of sample is obtained.

- 1. Industry practice permits 1/8" thick adhesive joints.

- C. Drawings: The epoxy joint construction including mechanical anchoring and framing shall be shown on the shop drawings.

- D. Shop Assembly Requirements: Stone shall be dry and free from grease, oil, dirt, loose particles, and efflorescence. Clean compressed air should be employed to blow stone dust from the pores of the stone. Heat is recommended for the removal of moisture from the stone prior to applying epoxy. No moisture should be observed creeping into areas to be bonded following the removal of heat.

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1. Units shall not be assembled when the stone temperature and the surrounding air temperatures are below 50 degrees. For above 95 degrees F. Assembly of units below 50 degrees F is permitted when the temperature of the stone units and adhesive is raised by heating to a temperature above 50 degrees F. After the units have been joined, heat should continue to be applied to the stone adjacent to the joint area to give the adhesive the curing temperature above 50 degrees F. Approved clips, frames, expansion bolts, and other mechanical connections shall be installed in strict accordance with approved shop drawings.
2. Adhesive shall be mixed in parts by weight or parts by volume in strict accordance with manufacturer's instructions, with strict compliance to the manufacturer's recommendations on the "pot life" of the adhesive.
3. Upon joining the stone members together, suitable clamps or bracing shall be used to keep the stone in proper alignment until the adhesive sufficiently hardens. Process shall include any and all shims needed to insure proper alignment.
4. Assembled limestone units shall not be moved until the adhesive has cured sufficiently to assure there will be no joint damage. Curing shall continue until the adhesive has reached the required hardness. When stones are pressed together, the adhesive shall flow out of the joint. On exposed joints, in a textured finish, it is recommended that the excessive adhesive be removed after the adhesive has taken on its initial hardening. The extra adhesive may be scraped away with a putty knife. Any excessive adhesive on smooth finish may be removed after complete hardening with the use of power sanders.
5. All dowels, anchors, expansion bolts, bearing plates, and other steel items in direct contact with the stone or contained within the stone shall be stainless steel AISI Type 304 or 316. Frames, plates, and other steel shapes not in direct contact with the stone shall be ASTM A-36 hot-dipped after fabrication per ASTM A-123. Bolts not in contact with the stone shall be ASTM A-325 or equal and shall be galvanized or plated with zinc or cadmium.
6. Fabricate and assemble structural framing in shop to comply with AISC Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings, including "Commentary" and Supplements thereto as issued, and as indicated on final shop drawings.
7. Weld or bolt connections to comply with the following requirements.
8. Install high strength threaded fasteners to comply with AISC Specifications for Structural Joints using ASTM A-325 or A-490 bolts approved by the Research

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Council on Riveted and Bolted Structural Joints of the Engineering Foundation (RCRBSJ).

9. Weld connections to comply with AWS D1.1 Structural Welding Code-Steel.

- E. Transportation and Storage: Extreme care shall be taken to insure that the assembled units are free of torsional stress during transportation, handling and storage.
- F. Erection: The stone fabricator shall make provisions for the employment of the necessary lifting methods of the assembled units, in cooperation with the erector. Such lifting devices as clamps, slings, etc., shall be furnished by the erector.

2.6 STONE ACCESSORIES

- A. Setting Shims: Lead, stainless steel, or plastic shims, non-staining to stone, sized to suit joint thicknesses and bed depths of stonework involved without intruding into required depths of joint sealants.
- B. Weep and Vent Tubes: Medium-density polyethylene tubing, 1/4-inch OD of length required to extend from exterior face of stone to cavity behind.

2.7 STONE FABRICATION

- A. General: Fabricate stone units in sizes and shapes required to comply with requirements indicated.
 - 1. For limestone, comply with recommendations in ILI's "Indiana Limestone Handbook."
- B. Cut and drill sinkages and holes in stone for anchors, fasteners, supports, and lifting devices as indicated or needed to set stone securely in place.
- C. Cut stone to produce pieces of thickness, size, and shape indicated or required and within fabrication tolerances recommended by ILI.
- D. Thickness of Exterior Stone Cladding:
 - 1. Provide stone thicknesses required to comply with performance requirements but not less than shown on the bridge drawings. Use tables in Indiana Limestone Handbook as a guide to size requirements.
- E. Control depth of stones and back-checks to maintain a clearance between backs of stones and surfaces or projections of structural members, fireproofing (if any), backup walls, and other work behind stones.
- F. Cut joints (bed and vertical/head) straight and at 90 degree angle to face, unless otherwise indicated].

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- G. Quirk-Miter corners, unless otherwise indicated; shall provide for cramp anchorage in top and bottom bed joints of corner pieces.
- H. Cut stones to produce joints of uniform width and in locations indicated.
- I. Contiguous Work: Provide chases, reveals, reglets, openings, and similar features as required to accommodate contiguous work.
- J. Fabricate molded work, including washes and drips, to produce stone shapes having a uniform profile throughout their entire length and with precisely formed arises slightly eased to prevent snipping, and matched at joints between units.
- K. Carve and cut decorative surfaces and inscriptions to conform with shaded drawings or models approved by the design team. Use skilled stone carvers experienced in the successful performance of work similar to that indicated.
- L. Finish exposed faces and edges of stones to comply with requirements indicated for finish under each type and application of stone required and to match approved samples and field-constructed mockups.

2.8 MORTAR MIXES

- A. General: Comply with referenced standards and with manufacturers' written instructions for mix proportions, mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures needed to produce mortar of uniform quality and with optimum performance characteristics.
 - 1. Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated. Do not use calcium chloride.
 - 2. Combine and thoroughly mix cementitious materials, water, and aggregates in a mechanical batch mixer unless otherwise indicated. Discard mortar when it has reached initial set.
- B. Portland Cement-Lime Setting Mortar: Comply with ASTM C 270, Proportion Specification for types of mortar indicated below:
 - 1. Set limestone with Type N mortar.

2.9 ELASTOMERIC SEALANTS

- A. Elastomeric sealants are not required for exterior stone cladding application of this project.

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PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to receive dimension stone cladding and conditions under which dimension stone cladding will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of dimension stone cladding.
- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of dimension stone cladding.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Advise installers of other work about specific requirements relating to placement of inserts, flashing reglets and similar items which will be used by stonework installer for anchoring, supporting and flashing of stonework. Furnish installers of other work with drawings or templates showing locations of these items. General contractor or concrete contractor will provide drawings to locate weld-plates and embeds for connection of stone skin or its system.
- B. Clean stone surfaces which have become dirty or stained prior to setting to remove soil, stains and foreign materials. Clean stones by thoroughly scrubbing stones with fiber brushes followed by a thorough drenching with clear water. Use only mild cleaning compounds that contain no acid, caustic, or abrasives.

3.3 SETTING STONE CLADDING, GENERAL

- A. Execute stonework by skilled mechanics, and employ skilled stone fitters at the site to do necessary field cutting as stones are set.
 - 1. Use power saws to cut stones; for exposed edges, produce edges which are cut straight and true. Mallet and chisel will be permitted provided craftsmen are skilled in their use.
 - 2. Stone Extending Below Grade: Beds, joints, back surfaces, and face surfaces below grade.
- B. Contiguous Work: Provide chases, reveals, reglets, openings and other spaces as indicated for accommodating contiguous work. Close up opening in stonework after other work is in place with stonework which matches that already set.
- C. Set stones to comply with requirements indicated on drawings and final shop drawings. Install anchors, supports, fasteners and other attachments indicated or

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necessary to secure stonework in place. Shim and adjust anchors, supports and accessories to set stones accurately in locations indicated with uniform joints of widths indicated and with edges and faces aligned according to established relationships and indicated tolerances.

- D. Dampproofing for stain prevention: Where indicated on drawings, coatings of either (a) cementitious waterproof stone backing or (b) bituminous dampproofing shall be applied on backs, beds, and joints of all stones used at grade. Dampproof all adjacent concrete surfaces on which limestone will rest, including concrete haunches and ledges, as well as support angles.
1. Dampproof unexposed surfaces of stone to at least 1'-0" above grade.
 2. Dampproof joints only to within 1" of finished surfaces when using bituminous or asphaltic solutions.
 3. Stones extending below grade shall be dampproofed as above, and in addition shall be dampproofed to the level of grade on their face surfaces which are covered.
 4. Cementitious coatings must be allowed to cure before treated stone is set. Due care must be exercised in handling all dampproofed stone to avoid chipping or off-setting.
- E. Construction Tolerances: Set stones to comply with the following tolerances:
1. Variation from Plumb: For lines and surfaces of columns, wall and arises, do not exceed ¼-inch in 10', 3/8" in a story height or 20' maximum, nor ½-inch in 40' or more. For external corners, expansion joints and other conspicuous lines do not exceed ¼-inch in any story or 20' maximum, or ½-inch in 40' or more.
 2. Variation of Linear Building Line: For position shown in plan and related portion of columns, walls and partitions, do not exceed ½-inch in any bay or 20' maximum, or ¾-inch in 40' or more.
 3. Variation of Linear Building Line: For position shown in plan and related portion of columns, walls and partitions, do not exceed ½-inch in any bay or 20' maximum, or ¾-inch 40' or more.
 4. Variation in Cross-Sectional Dimensions: For columns and thickness of walls from dimensions indicated, do not exceed minus ¼-inch or plus ½-inch.
 5. Note: The tolerances in this section are masonry industry setting tolerances and are provided for the convenience of the specifier. As a production industry, the Indiana Limestone industry cannot and does not control them
- F. Provide expansion joints, control joints, and pressure-relieving joints of widths and at locations indicated or required.

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1. Sealants, expansion, and other joints are specified in Division 7 Section "Joint Sealants".
2. Use no mortar or shims in expansion joints.

3.4 SETTING MECHANICALLY ANCHORED STONE CLADDING

- A. Set dimension stone cladding with mechanical anchors without mortar unless otherwise indicated.
- B. Attach anchors securely to stone and to backup surfaces. Comply with recommendations in ASTM C 1242.
- C. Provide compressible filler in ends of dowel holes and bottoms of kerfs to prevent end bearing of dowels and anchor tabs on stone. Fill remainder of anchor holes and kerfs with sealant indicated for filling kerfs.
- D. Set stone supported on clips or continuous angles on resilient setting shims. Use material of thickness required to maintain uniform joint widths and to prevent point loading of stone on anchors. Hold shims back from face of stone a distance at least equal to width of joint.

3.5 SETTING STONE CLADDING WITH MORTAR

- A. Set dimension stone cladding with mortar and mechanical anchors unless otherwise indicated.
- B. Set stone in full bed of mortar with head joints filled unless otherwise indicated.
 1. Use setting buttons of adequate size, in sufficient quantity, and of thickness required to maintain uniform joint width and to prevent mortar from extruding. Hold buttons back from face of stone a distance at least equal to width of joint, but not less than depth of pointing materials.
 2. Do not set heavy units or projecting courses until mortar in courses below has hardened enough to resist being squeezed out of joint.
 3. Support and brace projecting stones until wall above is in place and mortar has set.
 4. Provide compressible filler in ends of dowel holes and bottoms of kerfs to prevent end bearing of dowels and anchor tabs on stone. Fill remainder of anchor holes and kerfs with mortar.
- C. Fill space between back of stone units and backup wall solidly with mortar or grout.
- D. Embed ends of sills in mortar; leave remainder of joint open until final pointing.

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- E. Rake out joints for pointing with mortar to depths of not less than 1/2 inch (12 mm). Rake joints to uniform depths with square bottoms and clean sides.
- F. Prepare stone-joint surfaces for pointing with mortar by removing dust and mortar particles. Where setting mortar was removed to depths greater than surrounding areas, apply first layer of pointing mortar in layers not more than 3/8 inch (10 mm) until a uniform depth is formed.
- G. Point stone joints by placing pointing mortar in layers not more than 3/8 inch (10 mm). Compact each layer thoroughly and allow to become thumbprint hard before applying next layer.
- H. Tool joints with a round jointer having a diameter 1/8 inch (3 mm) larger than width of joint, when pointing mortar is thumbprint hard.

3.6 JOINT-SEALANT INSTALLATION

- A. Joint Sealants are not required for exterior stone cladding application.

3.7 ADJUSTING AND CLEANING

- A. Remove and replace broken, chipped, stained, or otherwise damaged stone, defective joints, and dimension stone cladding that does not match approved samples and mockups. Damaged stone may be repaired if Architect approves methods and results.
- B. Replace damaged or defective work in a manner that results in dimension stone cladding's matching approved samples and mockups, complying with other requirements, and showing no evidence of replacement.
- C. In-Progress Cleaning: Clean dimension stone cladding as work progresses. Remove mortar fins and smears before tooling joints. Remove excess sealant and smears as sealant is installed.
- D. Final Cleaning: Clean stone cladding no fewer than six days after completion of pointing and sealing, using clean water and stiff-bristle fiber brushes. Do not use wire brushes, acid-type cleaning agents, cleaning agents containing caustic compounds or abrasives, or other materials or methods that could damage stone. Mechanical or pressure cleaning may be used if approved by the design team.

3.8 PROTECTION

- A. Provide final protection and maintain conditions, in a manner acceptable to fabricator and installer, which ensures stonework being without damage or deterioration at time of substantial completion.

END OF SECTION 044200

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SECTION 044300 - STONE MASONRY AND LIMESTONE BENCHES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes the following applications of limestone stone masonry veneer:
 - 1. Anchored to concrete backup at Silo Center trailhead retaining wall.
 - 2. Limestone blocks for benches.
- B. Related Sections:
 - 1. Division 03 "Cast-in-Place Concrete" for structural concrete backup and footings.
 - 2. Division 07 "Joint Sealants" for joint sealants in stone masonry.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
 - 1. For limestone varieties proposed for use on Project, include test data indicating compliance with physical properties required by referenced ASTM standards.
 - 2. Technical data for all stone accessories required.
- B. Samples for Initial Selection: For colored mortar and other items involving color selection.
- C. Samples for Verification:
 - 1. For limestone type indicated. Include at least three samples in each set for each type of stone, exhibiting extremes of the full range of color and other visual characteristics expected in completed Work. Samples will establish the standard by which stone provided will be judged.
 - 2. For each color of mortar required.
- D. Shop Drawings:
 - 1. Submit cutting and setting drawings indicating sizes, dimensions, sections and profiles of stones. Include arrangement and provisions for jointing, supporting, anchoring and bonding stonework.

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1.4 INFORMATIONAL SUBMITTALS

- A. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, sources of supply, and other information as required to identify materials used. Include mix proportions for mortar and source of aggregates.
 - 1. Submittal is for information only. Neither receipt of list nor approval of mockups constitutes approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.
- B. Qualification Data: For qualified Installer.

1.5 PRECONSTRUCTION TESTING

- A. Test limestone for compliance with physical property requirements as listed in ASTM C-568 and the ILI. Submit the following test reports:
 - 1. ASTM C 99 Modulus of Rupture
 - 2. ASTM C 170 Compressive Strength

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs experienced stonemasons and stone fitters and who has successfully completed projects similar in material, design and extent. If requested, submit list of completed projects, with photographs and contact information.
 - 1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval.
- B. Source Limitations for Stone: Obtain limestone, from one quarry with resources to provide materials of consistent quality in appearance and physical properties. Make quarried blocks available for inspection by Architect.
- C. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.
- D. Mockups: Build mockups to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Build mockups for typical exterior wall veneer in sizes approximately 72 inches long by 72 inches high by full thickness, including anchors, flashings and accessories.
 - a. Include partial stone coping at top of mockup.
 - b. Include a sealant-filled joint at least 48 inches long in mockup.
 - c. Include veneer anchors and weep holes in exterior masonry-veneer wall mockup.

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2. Build mockup in location designated by Architect. Protect accepted mockups from the elements with weather-resistant membrane.
 3. Approval of mockups is for color, texture, and blending of stone; relationship of mortar and sealant colors to stone colors; tooling of joints; and aesthetic qualities of workmanship.
 - a. Approval of mockups is also for other material and construction qualities Architect specifically approves in writing.
 - b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 4. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- E. Preinstallation Conference: Conduct conference at Project site.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- B. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- C. Deliver preblended, dry mortar mix in moisture-resistant containers designed for lifting and emptying into dispensing silo. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.
- D. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.
- E. Limestone Benches: Unload benches at job site in such a manner that no damage occurs to limestone. Product shall remain safe and undamaged at all times.

1.8 PROJECT CONDITIONS

- A. Protection of Stone Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed stone masonry when construction is not in progress.
 1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.
- B. Stain Prevention: Immediately remove mortar and soil to prevent them from staining the face of stone masonry.

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1. Protect base of walls from rain-splashed mud and mortar splatter by coverings spread on the ground and over the wall surface.
 2. Protect sills, ledges, and projections from mortar droppings.
 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 4. Turn scaffold boards near the wall on edge at end of each day to prevent rain from splashing mortar and dirt on completed stone masonry.
 5. Protection of limestone benches: During construction, protect exterior limestone blocks and steps from damage from adjacent construction.
- C. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace stone masonry damaged by frost or freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ ASCE 6/TMS 602.
1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until masonry has dried, but not less than 7 days after completing cleaning.
- D. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

1.9 COORDINATION

- A. Advise installers of other work about specific requirements for placement of reinforcement, veneer anchors, flashing, and similar items to be built into stone masonry.
- B. Limestone Benches: Sequence installation with other work to minimize the possibility of damage to benches during remainder of construction period.

PART 2 - PRODUCTS

2.1 LIMESTONE

- A. Limestone: Comply with ASTM C 568.
 1. Products: Subject to compliance with requirements, stone varieties that may be incorporated into the Work include, but are not limited to, the following:
 - a. Variegated limestone from Reed Quarry fabricated by Accent Limestone and Carving, smooth finish (36 grit sanded), rubbed edges (1/32" chamfer).
 - b. Benches: blocks fabricated to sizes shown on drawings with split face finish.
 2. Products: Indiana oolitic limestone quarried in Monroe County, Indiana.
 3. Classification: II Medium-Density.

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4. Description: Oolitic limestone.
 5. Finish for all Exposed Faces: Smooth (36 grit sanded)
 6. Sizes: As indicated on drawings.
 7. Pattern: As indicated on drawings.
- B. Indiana Oolitic Limestone Grade and Color: Variegated, according to grade and color classification established by ILI.
- C. Match Architect's samples for color, finish, and other stone characteristics relating to aesthetic effects.
- D. Stone shall be approved by 21st Century Parks, Inc. Manufacturer shall have a representative on site to supervise installation of the stones until the contractor demonstrates proficiency in installation, as determined by the Architect.

2.2 MORTAR MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated and as recommended by ILI.
1. Low-Alkali Cement: Not more than 0.60 percent total alkali when tested according to ASTM C 114.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with a record of satisfactory performance in stone masonry mortar.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Davis Colors; True Tone Mortar Colors.
 - b. Lanxess Corporation; Bayferrox Iron Oxide Pigments.
 - c. Solomon Colors; SGS Mortar Colors.
- D. Aggregate: ASTM C 144 and as follows:
1. For pointing mortar, use aggregate graded with 100 percent passing No. 16 (1.18-mm) sieve.
 2. White Aggregates: Natural white sand or ground white stone.
 3. Colored Aggregates: Natural-colored sand or ground marble, granite, or other sound stone; of color necessary to produce required mortar color.
 - a. Match Architect's sample.

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- E. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
- F. Water: Potable.
- G. Pointing Mortar: As recommended by III.

2.3 VENEER ANCHORS

- A. Materials:
 - 1. Stainless-Steel Wire: ASTM A 580/A 580M, Type 304 or Type 316.
 - 2. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304 or Type 316.
- B. Size: Sufficient to extend at least halfway, but not less than 1-1/2 inches, through stone masonry and with at least 5/8-inch cover on outside face. Refer to Structural Specifications for additional requirements.
- C. Wire Veneer Anchors: Wire ties formed from W1.7 or 0.148-inch- diameter, stainless-steel wire.
 - 1. Ties are bent in the form of loops with legs not less than 15 inches in length and with last 2 inches bent at 90 degrees.
 - 2. Ties are bent in the form of rectangular loops with ends bent downward for inserting into eyes projecting from masonry joint reinforcement.
- D. Corrugated-Metal Veneer Anchors: Not less than 0.030-inch- thick by 7/8-inch- wide stainless-steel sheet with corrugations having a wavelength of 0.3 to 0.5 inch and an amplitude of 0.06 to 0.10 inch.
- E. Adjustable, Screw-Attached Veneer Anchors: Units consisting of a wire tie section and a metal anchor section that allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to wood or metal studs, and as follows:
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Dur-O-Wal, a Dayton Superior Company; D/A 213 or D/A 210 with D/A 700-708.
 - b. Heckmann Building Products Inc.; 315-D with 316 or Pos-I-Tie.
 - c. Hohmann & Barnard, Inc.; DW-10 DW-10HS or DW-10-X.
 - d. Wire-Bond; 1004, Type III or RJ-711.
 - 2. Structural Performance Characteristics: Capable of withstanding a 100-lbf load in both tension and compression without deforming or developing play in excess of 0.05 inch .
 - 3. Anchor Section: Rib-stiffened, sheet metal plate with screw holes top and bottom, 2-3/4 inches wide by 3 inches high; with projecting tabs having slotted holes for inserting vertical legs of wire tie specially formed to fit veneer anchor section.

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4. Anchor Section: Sheet metal plate, 1-1/4 inches wide by 6 inches or 9 inches as required long, with screw holes top and bottom and with raised rib-stiffened strap, 5/8 inch wide by 5-1/2 inches long, stamped into center to provide a slot between strap and plate for inserting wire tie.
 5. Anchor Section: Gasketed sheet metal plate, 1-1/4 inches wide by 6 inches long, with screw holes top and bottom and raised rib-stiffened strap, 5/8 inch wide by 6 inches long, stamped into center to provide a slot between strap and plate for inserting wire tie. Provide anchor manufacturer's standard, self-adhering, modified bituminous gaskets manufactured to fit behind anchor.
 6. Fabricate sheet metal anchor sections and other sheet metal parts from 0.109-inch-thick, stainless-steel sheet.
 7. Wire Ties: Triangular-, rectangular-, or T-shaped wire ties fabricated from 0.25-inch-diameter, stainless-steel wire.
- F. Seismic Veneer Anchors: Units consisting of a metal anchor section and a connector section designed to engage a continuous wire embedded in stone masonry mortar joint, complying with the following requirements:
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Dur-O-Wal, a Dayton Superior Company; D/A 213S.
 - b. Hohmann & Barnard, Inc.; DW-10-X-Seismicclip.
 - c. Wire-Bond; RJ-711 with Wire-Bond Clip.
 2. Structural Performance Characteristics: Capable of withstanding a 100-lbf load in both tension and compression without deforming or developing play in excess of 0.05 inch.
 3. Anchor Section: Rib-stiffened, sheet metal plate with screw holes top and bottom, 2-3/4 inches wide by 3 inches high; with projecting tabs having slotted holes for inserting vertical leg of connector section.
 4. Connector Section: Rib-stiffened, sheet metal bent plate with down-turned leg designed to fit in anchor section slot and with integral tabs designed to engage continuous wire. Size connector to extend at least halfway through stone masonry but with at least 5/8-inch cover on outside face.
 5. Anchor Section: Rib-stiffened, sheet metal plate with screw holes top and bottom, 2-3/4 inches wide by 3 inches high; with projecting tabs having slotted holes for inserting vertical legs of wire tie specially formed to fit anchor section. Size wire tie to extend at least 1-1/2 inches into stone masonry but with at least 5/8-inch cover on outside face.
 6. Connector Section: Sheet metal clip welded to wire tie with integral tabs designed to engage continuous wire.
 7. Anchor Section: Gasketed sheet metal plate, 1-1/4 inches wide by 6 inches long, with screw holes top and bottom and raised rib-stiffened strap, 5/8 inch wide by 6 inches long, stamped into center to provide a slot between strap and plate for inserting wire tie. Provide anchor manufacturer's standard, self-adhering, modified bituminous gaskets manufactured to fit behind anchor plate and extend beyond pronged legs.
 8. Connector Section: Triangular wire tie and rigid PVC extrusion with snap-in grooves for inserting continuous wire.

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9. Fabricate sheet metal anchor sections and other sheet metal parts from 0.109-inch-thick, stainless-steel sheet.
 10. Fabricate wire connector sections from 0.25-inch- diameter, stainless steel wire.
 11. Continuous Wire: 0.188-inch- diameter, stainless-steel wire.
- G. Polymer-Coated, Steel Tapping Screws for Concrete: Self-tapping screws with specially designed threads for tapping and wedging into masonry, with hex washer head and neoprene washer, 3/16-inch diameter by 1-1/2-inch length, and with organic polymer coating with salt-spray resistance to red rust of more than 800 hours per ASTM B 117.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. ITW-Buildex; Tapcon.
 - b. Powers Fasteners; Tapper.

2.4 STONE TRIM ANCHORS

- A. Stone Trim Anchors: Units fabricated with tabs or dowels designed to engage kerfs or holes in stone trim units and holes for fasteners or postinstalled anchor bolts for fastening to substrates as indicated.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Halfen Anchoring Systems; Meadow Burke.
 - b. Heckmann Building Products Inc.
 - c. Hohmann & Barnard, Inc.
- B. Materials: Fabricate anchors from stainless steel, ASTM A 240/A 240M, Type 304. Fabricate dowels from stainless steel, ASTM A 276, Type 304.
- C. Fasteners for Stone Trim Anchors: Annealed stainless-steel bolts, nuts, and washers; ASTM F 593 for bolts and ASTM F 594 for nuts, Alloy Group 1.
- D. Postinstalled Anchor Bolts for Fastening Stone Trim Anchors: Chemical anchors made from stainless-steel components complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 for bolts and nuts; ASTM A 666 or ASTM A 276, Type 304 or 316, for anchors.

2.5 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene, urethane or PVC.

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- B. Cementitious Dampproofing: Cementitious formulations that are recommended by ILLI and that are nonstaining to stone, compatible with joint sealants, and noncorrosive to veneer anchors and attachments.
- C. Asphalt Dampproofing: Cut-back asphalt complying with ASTM D 4479, Type I as recommended by ILLI.
- D. Weep Hole/Vent Products: Use all of the following unless otherwise indicated:
 - 1. Wicking Material: Absorbent rope, made from UV-resistant synthetic fiber, 1/4 to 3/8 inch in diameter, in length required to produce 2-inch exposure on exterior and 18 inches in cavity behind stone masonry. Use only for weep holes.
 - 2. Rectangular Plastic Tubing: Clear butyrate, with screen, 3/8 by 1-1/2 inches by thickness of stone masonry.
- E. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.
 - 1. Provide one of the following configurations:
 - a. Strips, full-depth of cavity and 10 inches wide, with dovetail shaped notches 7 inches deep that prevent mesh from being clogged with mortar droppings.
 - 2. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Advanced Building Products Inc.; Mortar Break.
 - b. CavClear/Archovations, Inc.; CavClear Masonry Mat.
 - c. Dur-O-Wal, a Dayton Superior Company; Polytite MortarStop.
 - d. Mortar Net USA, Ltd.; Mortar Net.

2.6 MASONRY CLEANERS

- A. Limestone Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar and grout stains, efflorescence, and other new construction stains from stone masonry surfaces without discoloring or damaging masonry surfaces; expressly approved for intended use by cleaner manufacturer and stone producer.

2.7 MORTAR MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
 - 1. Do not use calcium chloride.
 - 2. Limit cementitious materials in mortar to portland cement and lime.

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3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
 4. Mixing Pointing Mortar: Thoroughly mix cementitious and aggregate materials together before adding water. Then mix again, adding only enough water to produce a damp, unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for one to two hours. Add remaining water in small portions until mortar reaches desired consistency. Use mortar within 30 minutes of final mixing; do not retemper or use partially hardened material.
- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in the form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C. Mortar for Stone Masonry: Comply with ASTM C 270, Proportion Specification.
1. Mortar for Setting Stone: Type N.
 2. Mortar for Pointing Stone: Type N.
- D. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products.
1. Pigments shall not exceed 10 percent of portland cement by weight.
 2. Mix to match Architect's sample.
- E. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.
1. Mix to match Architect's sample.

2.8 FABRICATION

- A. Fabricate stone to comply with sizes, shapes, and tolerances recommended by applicable stone association or, if none, by stone source, for faces, edges, beds, and backs.
1. For limestone, comply with recommendations in ILI's "Indiana Limestone Handbook."
- B. Cut stone to produce pieces of thickness, size, and shape indicated, including details on Drawings. Dress joints (bed and vertical) straight and at right angle to face unless otherwise indicated.
- C. Cut and drill sinkages and holes in stone for anchors and supports.
- D. Carefully inspect stone at quarry or fabrication plant for compliance with requirements for appearance, material, and fabrication. Replace defective units before shipment.
1. Clean sawed backs of stone to remove rust stains and iron particles.
- E. Thickness of Stone: Provide thickness indicated.

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- F. Shape stone for type of masonry (pattern) as indicated.
- G. Finish exposed faces and edges of stone to comply with requirements indicated for finish and to match approved samples and mockups.
 - 1. Finish: Smooth
 - 2. Finish for Copings: Smooth
 - a. Finish exposed ends of copings same as front and back faces.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces indicated to receive stone masonry, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance. Remove loose material that could affect veneer and accessory anchoring.
- B. Examine concrete substrate to verify that inserts, reinforcement, veneer anchors, flashing, and other items installed in substrates and required for or extending into stone masonry are correctly installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.
- D. Limestone Benches: Examine areas and conditions under which benches are to be installed, remedy any conditions detrimental to the timely and proper completion of the work. Do not proceed with work until unsatisfactory conditions have been corrected in an acceptable manner.

3.2 PREPARATION

- A. Coat concrete substrate, footing and stone masonry with asphalt or cementitious dampproofing as recommended by ILL.
- B. Clean dirty or stained stone surfaces by removing soil, stains, and foreign materials before setting. Clean stone by thoroughly scrubbing with fiber brushes and then drenching with clear water. Use only mild cleaning compounds that contain no caustic or harsh materials or abrasives.

3.3 SETTING OF STONE MASONRY, GENERAL

- A. Perform necessary field cutting and trimming as stone is set.

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1. Use power saws to cut stone that is fabricated with saw-cut surfaces. Cut lines straight and true, with edges eased slightly to prevent snipping. Cleanly core drill all circular holes in stone.
- B. Sort stone before it is placed in wall to remove stone that does not comply with requirements relating to aesthetic effects, physical properties, or fabrication, or that is otherwise unsuitable for intended use.
- C. Arrange stones in pattern with course heights as indicated, uniform lengths, and uniform joint widths, with offset between vertical joints as indicated.
- D. Arrange stones with color variations uniformly dispersed for an evenly blended appearance.
- E. Set stone to comply with requirements indicated on Drawings. Install supports, fasteners, and other attachments indicated or necessary to secure stone masonry in place. Set stone accurately in locations indicated with edges and faces aligned according to established relationships and indicated tolerances.
- F. Maintain uniform joint widths except for minor variations are required to maintain bond alignment if any. Lay walls with joints of 5/8 inch typical.
- G. Provide sealant joints of widths and at locations indicated.
 1. Keep sealant joints free of mortar and other rigid materials.
 2. Sealing joints is specified in Section 079200 "Joint Sealants."
- H. Coat limestone with cementitious dampproofing as follows:
 1. Stone at Grade: Beds, joints, and back surfaces to at least 12 inches above finish-grade elevations.
 2. Stone Extending below Grade: Beds, joints, back surfaces, and face surfaces below grade.
 3. Allow cementitious dampproofing formulations to cure before setting dampproofed stone. Do not damage or remove dampproofing in the course of handling and setting stone.
- I. Place weep holes and vents in joints where moisture may accumulate, including at base of cavity walls, above shelf angles, and at flashing.
 1. Use weep holes/vents to form weep holes.
 2. Use wicking material to form weep holes above flashing in stone sills. Turn wicking down at lip of sill to be as inconspicuous as possible.
 3. Space weep holes/vents 24 inches o.c. or as recommended by ILI.
 4. Trim wicking material used in weep holes flush with outside face of wall after mortar has set.
 5. Place pea gravel in cavities as soon as practical to a height of not less than 2 inches above top of flashing, to maintain drainage.

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6. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in "Miscellaneous Masonry Accessories" Article.
- J. Install vents in vertical head joints at the top of each continuous cavity at spacing indicated. Use screened weep holes/vents to form vents.

3.4 CONSTRUCTION TOLERANCES

- A. Variation from Plumb: For vertical lines and surfaces, do not exceed 1/4 inch in 10 feet, 3/8 inch in 20 feet or 1/2 inch in 40 feet or more. For external corners, expansion joints, control joints, and other conspicuous lines, do not exceed 1/4 inch in 20 feet or 1/2 inch in 40 feet or more.
- B. Variation from Level: For bed joints and lines of exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines, do not exceed 1/2 inch in 20 feet or 3/4 inch in 40 feet or more.
- C. Variation of Linear Building Line: For position shown in plan, do not exceed 1/2 inch in 20 feet or 3/4 inch in 40 feet or more.
- D. Measure variation from level, plumb, and position shown in plan as variation of the average plane of the face of each stone from level, plumb, or dimensioned plane.
- E. Variation in Mortar-Joint Thickness: Do not vary from joint size range indicated.
- F. Variation in Plane between Adjacent Stones: Do not exceed one-half of tolerance specified for thickness of stone.

3.5 INSTALLATION OF ANCHORED STONE MASONRY

- A. Anchor stone masonry to concrete with corrugated-metal veneer anchors unless otherwise indicated on structural drawings.
- B. Embed veneer anchors in mortar joints of stone masonry at least halfway, but not less than 1-1/2 inches through stone masonry and with at least 5/8-inch cover on outside face.
 1. Install continuous wire reinforcement in horizontal joints and attach to seismic veneer anchors as stone is set.
- C. Space anchors to provide not less than 1 anchor per 2 sq. ft. of wall area. Install additional anchors within 12 inches of openings, sealant joints, and perimeter at intervals not exceeding 12 inches or as indicated on structural drawings.
- D. Anchor stone cap trim with stone trim anchors where indicated. Install anchors by fastening to substrate and inserting tabs and dowels into kerfs and holes in stone units. Provide compressible filler in ends of dowel holes and bottoms of kerfs to prevent end bearing of dowels and anchor tabs on stone. Fill remainder of anchor holes and kerfs with mortar.

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- E. Set stone in full bed of mortar with full head joints unless otherwise indicated. Build anchors into mortar joints as stone is set.
- F. Provide 2-inch open cavity between stone masonry and backup concrete construction unless otherwise indicated. Keep cavity free of mortar droppings and debris.
 - 1. Place mortar spots in cavity at veneer anchors to maintain spacing.
 - 2. Slope beds toward cavity to minimize mortar protrusions into cavity.
 - 3. Do not attempt to trowel or remove mortar fins protruding into cavity.
- G. Rake out joints for pointing with mortar to depth of not less than 1/2 inch before setting mortar has hardened. Rake joints to uniform depths with square bottoms and clean sides.

3.6 INSTALLATION OF LIMESTONE BENCHES

- A. Benches shall be located where shown on plans, and as shown on detail drawings, unless otherwise directed by Architect. Review site furnishings location with Architect prior to installation.
- B. Set benches on aggregate base over compacted sub-base as indicated.

3.7 POINTING

- A. Prepare stone-joint surfaces for pointing with mortar by removing dust and mortar particles. Where setting mortar was removed to depths greater than surrounding areas, apply pointing mortar in layers not more than 3/8 inch deep until a uniform depth is formed.
- B. Point stone joints by placing and compacting pointing mortar in layers not more than 3/8 inch deep. Compact each layer thoroughly and allow to become thumbprint hard before applying next layer.
- C. Tool joints, when pointing mortar is thumbprint hard, with a smooth jointing tool to produce the following joint profile:
 - 1. Joint Profile: Smooth, flat face slightly below edges of stone.

3.8 ADJUSTING AND CLEANING

- A. Remove and replace stone masonry of the following description:
 - 1. Broken, chipped, stained, or otherwise damaged stone. Stone may be repaired if methods and results are approved by Architect.
 - 2. Defective joints.
 - 3. Stone masonry not matching approved samples and mockups.
 - 4. Stone masonry not complying with other requirements indicated and as directed by Architect.

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- B. Replace in a manner that results in stone masonry matching approved samples and mockups, complying with other requirements, and showing no evidence of replacement.
- C. In-Progress Cleaning: Clean stone masonry as work progresses. Remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean stone masonry as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 - 2. Test cleaning methods on mockup; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before cleaning stone masonry.
 - 3. Clean stone masonry by bucket and stiff fiber brush hand-cleaning method. Do not use acidic cleaners.
 - 4. Clean limestone masonry to comply with recommendations in ILLI's "Indiana Limestone Handbook."

3.9 EXTRA MATERIALS AND WASTE

- A. Disposal of remaining Limestone Pieces: any remaining blocks and/or pieces of limestone shall be moved and stockpiled at a location determined by 21st Century Parks, Inc.

END OF SECTION 044300

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SECTION 044301 ROCK FENCE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Plantation Era Rock Fence
- B. Related Sections:
 - 1. Division 31 Section "Earthwork" for excavation, filling, and rough grading and for subsurface aggregate drainage and drainage backfill materials.

1.3 QUALITY ASSURANCE

- A. Workmanship shall be of high quality, as recognized by the KyTC, DSC, and dry stone industry standards. DSC is the Dry Stone Conservancy. Their contact information is 1065 Dove Run Road, Suite 6, Lexington, Kentucky 40502 (859)266-4807 For a list of their certified mason, see their website at www.drystone.org.

1.4 MASON QUALIFICATIONS

- A. All dry stone masonry work will be accomplished under the direct supervision of a Mason qualified under any of the following levels of certifications administered by DSC [or equivalent certifying organization]: DSC Journeyman, DSC Basic Qualified, and/or KyTC Qualified.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS FOR STONE

- A. Obtain limestone from a quarry located in Central Kentucky with resources to provide material of consistent quality in appearance and physical properties as described in this specification.

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2.2 MATERIALS, STONE

- A. Match limestone in existing dry-laid fences, as described and in photographs for variety, color range, finish, dimensions, and other stone characteristics related to aesthetic effects. Supply limestone building stone that is sound (not fractured due to blasting techniques), gray, fossiliferous, bioclastic matrix, crystalline limestone from the Lexington Limestone Formation. Supply limestone that is gray in color with a range from light to dark.
- B. Stone shall match the same family of stones used for the “Plantation Era” Rock Fence at the Creekside Playground located at 1310 South Beckley Station Rd, Louisville KY 40245.

PART 3 - EXECUTION

3.1 PREPARATION OF SITE

- A. Prepare a 34"-wide, 4-5"deep level trench in soil at 95% compaction. Contractor may elect to build on a compacted gravel footing.
- B. When a rock fence wall abuts a sidewalk, rock fence is to be built after the installation of the sidewalk. Hold rock fence tight to edge of sidewalk.

3.2 FENCE CONSTRUCTION

- A. Thoroughly mix the new and old stone for a homogenous finished appearance for the entire fence segment. At tie-ins effect structural improvements while maintaining the historic aesthetic appearance. Present weathered faces of historic stone to the exterior wherever possible (road or field side) with precedence to the road side, while maintaining minimum required depths from fence face into the interior. Use guide strings and build to a tolerance of one-half inch (½").

3.3 WALL HEIGHT

- A. Wall height may vary, but batter and width at cover course and cope shall remain constant. For a typical wall, 26" width at the base, tapering to 14" width at the top of cover course. See drawings for height of rock fence in specific locations.

3.4 COURSING

- A. Lay wall with the majority of the larger/thicker stones in the lower portion of the wall and smaller/thinner stones in the upper portion of the wall. Course work shall be random, with no more than three stones equaling the height of one adjacent stone.

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3.5 LINE AND STRAIGHTNESS

- A. Construct walling frame templates as per the dimensions of the drystone fence segment to be built. Use string lines to guide the work. The finished fence should be laid with a consistent batter and have clearly defined straight lines at foundation level, just below the tie level, at the cap course, and at the coping. Build to a tolerance of ½" from the string line.

3.6 BATTER

- A. Maintain a consistent 1" to 6" batter. Slope faces inward 1" for each 6" of wall height, excluding coping and foundation.

3.7 CORE

- A. Use large stones when practical and continue with smaller stones until gaps are filled. Interlock stones as much as possible.

3.8 FACE STONES

- A. Lay face stones with top surfaces level, abutting each other, pinned and supported from behind with little or no face chinking. Cover all joints. Strive for at least 2 inches of overlap.

3.9 PINNING

- A. Pin only when is needed, not for appearance. Avoid using multiple pins.

3.10 FOUNDATION COURSE

- A. Lay a level foundation course, providing an overlap on each side 3" to 5" wider than the subsequent fence base width. Use rocks that are 5" to 6" thick and have more than 50% of their depth under the main body of the fence above. Place foundation stones so their upper surfaces are level and lower surfaces are fully supported by the subgrade or through underpinning. Do not underpin from the front.

3.11 LOWER COURSES

- A. Use larger face stones on lower courses. Present weathered faces of historic stone to the exterior where possible, place so joints overlap. Ensure good contact between all stones. Point the long side of the stone in wherever possible, maintaining a minimum projection into the fence interior of at least 1/3 the wall width and no more than 2/3 the wall width. Fully support face stones. Build one layer at a time, pack and level the core simultaneously. Level the lower courses at 18" above the foundation for the first course of tie-rocks.

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3.12 TIE ROCKS

- A. Incorporate tie-rock courses at 18" vertical intervals within the wall, beginning at the foundation and continuing to cover course. Set ties not more than 48" (4 feet) on center. Overlap lower course joints wherever possible. Use single stones that span the full width of the wall. Fully support all ties. Place tie rocks projecting not more than 3" from either side of fence face.

3.13 UPPER COURSES

- A. Continue to place face stones around and over tie rocks as on the lower course. Present weathered faces of historic stone to the exterior where possible, maintaining a minimum projection into the fence interior of at least 6". Place so joints overlap. Ensure good contact between all stones.

3.14 COVER COURSES

- A. Level the upper courses below the cover course and allow coping height to adjust to various cover heights. Lay solid cover (cap) course to cover full top width specified 14". Project cover course not more than 2" to either side of fence face. Fully support all cover stones.

3.15 COPING

- A. Lay 9 - 12" tall single copes to within a one inch tolerance of guide strings. Individual copes shall be irregular, roughly-triangular shaped stones, fully supported with leveling pins, and placed on 15 degree downhill slope. Drive in wedges to level and lock in the cope. Allow variation in heights and thickness to match the historic appearance. Do not project cope beyond the face of the cover course. Rock Fence shall have the coping stones mortared into place similar to the "Plantation Era" Rock Fence at the Creekside Playground. The mortar shall be hidden from sight. The mortar shall be Brixment B-13 Mortar or approved equal.

3.16 WALLHEADS

- A. End fences with flush, squared ends with one-in-six, (1" to 6") batter. Use larger stones than those used within the body of the fence, with no more than three stones spanning the wallhead width per course. Lay alternate courses with long stones spanning the end width, alternating with courses where stone lengths run well back along the faces. Strive for two-over-one, and one-over-two wherever possible. Cap with one stone "cube" equal to the full height of the coping and spanning the full width of the fence top.

END OF SECTION 044301

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SECTION 044302 DRY LAID STONE HEADWALLS AND ENDWALLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Dry Laid Stone Headwall and Endwalls

B. Related Sections:

- 1. Division 31 Section "Earthwork" for excavation, filling, and rough grading and for subsurface aggregate drainage and drainage backfill materials.
- 2. Division 33 Section for "Storm Drainage."

1.3 QUALITY ASSURANCE

- A. Workmanship shall be of high quality, as recognized by the KyTC, Dry Stone Conservancy (DSC) and dry stone industry standards. DSC's contact information is 1065 Dove Run Road, Suite 6, Lexington, Kentucky 40502 (859)266-4807 For a list of certified masons, see their website at www.drystone.org.

1.4 MASON QUALIFICATIONS

- A. All dry stone masonry work will be performed under the direct supervision of a Mason qualified under any of the following levels of certifications administered by DSC or equivalent certifying organization: DSC Journeyman, DSC Basic Qualified, and/or KyTC Qualified.

1.5 SAMPLE SUBMITTALS

- A. Provide samples on the project site for each of the following types of stone. The stone samples need to show the range of colors expected for the Dry Laid Stone Headwalls and Endwalls. Approved samples may be installed in the work.
 - 1. Splash Stones
 - 2. Face Stones
 - 3. Lid Stones

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1.6 MOCK UPS

- A. After approval of the rock samples, and before constructing the Dry Laid Stone Headwalls and Endwalls, produce field sample mock-ups to demonstrate the full range of selections made under sample submittals. All mock-ups must be approved by the Architect prior to the final installation of the dry laid stone headwalls and endwalls. Produce at least one (1) full-scale mock-up at least 10 feet long, to demonstrate the expected range of color, stone face finish, splash stone finish and lid stone finish. Locate mock-ups as directed by the Architect. Maintain mock-ups during construction in an undisturbed condition as a standard for judging the completed work.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS FOR STONE

- A. Obtain limestone from a quarry located in Central Kentucky with resources to provide material of consistent quality in appearance and physical properties as described in this specification.

2.2 MATERIALS, STONE

- A. Supply limestone building stone that is sound (not fractured due to blasting techniques), gray, fossiliferous, bioclastic matrix, crystalline limestone from the Lexington Limestone Formation. Supply limestone that is gray in color with a range from light to dark.
- B. Stone shall match the same family of stones used for the "Plantation Era" Rock Fence at the Creekside Playground located at 1310 South Beckley Station Rd, Louisville KY 40245.

PART 3 - EXECUTION

3.1 PREPARATION OF SITE

- A. After the culvert pipe has been set at the correct elevation, prepare a 12" deep level trench in soil at 95% compaction. Place a 6" layer of compacted crushed stone at the bottom of the trench.

3.2 WALL CONSTRUCTION

- A. Thoroughly mix the stone for a homogenous finished appearance for the entire fence segment. Use guide strings and build to a tolerance of one-half inch (½").

3.3 WALL HEIGHT

- A. Wall height may vary due to culvert size. The headwalls and endwalls shall be a maximum of 12" above the culvert pipe unless otherwise stated in the drawings.

3.4 WALL RADIUS

- A. Wall radius may vary depending on the size of the culvert pipe – see the drawings for culvert pipe size and wall radius.

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3.5 COURSING

- A. Lay wall with the majority of the larger/thicker stones in the lower portion of the wall and smaller/thinner stones in the upper portion of the wall. Course work shall be random, with no more than three stones equaling the height of one adjacent stone.

3.6 LINE AND STRAIGHTNESS

- A. Construct walling frame templates per the dimensions of the drystone fence segment to be built. Use string lines to guide the work. The finished fence should be laid with a consistent batter. Build to a tolerance of ½" from the string line.

3.7 BATTER

- A. Maintain a consistent 1 to 6 ratio batter. Slope faces inward 1" for each 6" of wall height, excluding splash stones.

3.8 FACE STONES

- A. Lay face stones with top surfaces level, abutting each other, pinned and supported from behind with little or no face chinking. Cover all joints. Strive for at least 2 inches of overlap. Use larger face stones towards the bottom of the wall. Present weathered faces of stone to the exterior where possible. Ensure good contact between all stones. Fully support the face stones. Build one layer at a time. All face stones above the lid stone shall be mortared into place such that the mortar is hidden from sight. The mortar shall be Brixment B-13 Mortar or approved equal.

3.9 SPLASH STONES

- A. Lay a level foundation course, providing an overlap on each side 3" to 5" wider than the subsequent wall base width. Use rocks that are 5" to 6" thick and have more than 50% of their depth under the main body of the wall above. Place splash stones so their upper surfaces are level and lower surfaces are fully supported by the subgrade. Splash stones must be set below the culvert invert or flush with the culvert invert. The splash stones shall not prevent the flow of storm water exiting the culvert pipe. Splash stones shall extend for a minimum of three times the diameter of the culvert unless indicated on the drawings.

3.10 LID STONE

- A. Present weathered faces of stone to the exterior where possible, maintaining a minimum projection into the fence interior of at least 6". Place so joints overlap. Ensure good contact between all stones. Lid stone shall overlap the face stones on each side of the culvert opening by a minimum of 6".

END OF SECTION 044302

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SECTION 047200 - CAST STONE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Cast stone trim including the following:
 - a. Stone seat wall caps.

1.3 DEFINITIONS

- A. Cast Stone: Architectural precast concrete building units intended to simulate natural cut stone.

1.4 SUBMITTALS

- A. Shop Drawings: Show fabrication and installation details for cast stone units. Include dimensions, details of reinforcement and anchorages if any, and indication of finished faces.
 - 1. Include building elevations showing layout of units and locations of joints and anchors.
- B. Samples for Initial Selection: For colored mortar.
- C. Samples for Verification:
 - 1. For each color and texture of cast stone required, 10 inches square in size.
 - 2. For colored mortar. Make Samples using same sand and mortar ingredients to be used on Project. Label Samples to indicated types and amounts of pigments used.
- D. Mockup Samples: Furnish sample units as indicated on Drawings for installation in mockups.
- E. Full-Size Samples: For each type of cast stone unit required.
 - 1. Make available for Architect's review at Project site.
 - 2. Make Samples from materials to be used for units used on Project immediately before beginning production of units for Project.
 - 3. Approved Samples may be installed in the Work.

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- F. Qualification Data: For manufacturer and testing agency.
 - 1. Include copies of material test reports for completed projects, indicating compliance of cast stone with ASTM C 1364.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer of cast stone units similar to those indicated for this Project, with sufficient production capacity to manufacture required units.
 - 1. Manufacturer is a producing member of the Cast Stone Institute or has on file and follows a written quality-control plan approved by Architect that includes all elements of the Cast Stone Institute's "Quality Control Procedures Required for Plant Inspection."
- B. Testing Agency Qualifications: An independent testing agency qualified according to ASTM E 329 for testing indicated, as documented according to ASTM E 548.
- C. Source Limitations for Cast Stone: Obtain cast stone units through one source from a single manufacturer.
- D. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color, from one manufacturer for each cementitious component and from one source or producer for each aggregate.
- E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Build mockup of typical wall area as shown on Drawings.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Coordinate delivery of cast stone with unit masonry work to minimize the need for on-site storage and to avoid delaying the Work.
- B. Number each piece individually to match shop drawings and schedules.
- C. Pack, handle, and ship cast stone units in suitable packs or pallets.
 - 1. Lift with wide-belt slings; do not use wire rope or ropes that might cause staining. Move cast stone units, if required, using dollies with wood supports.
 - 2. Store cast stone units on wood skids or pallets with nonstaining, waterproof covers. Arrange to distribute weight evenly and to prevent damage to units. Ventilate under covers to prevent condensation.
- D. Store installation materials on elevated platforms, under cover, and in a dry location.
- E. Store mortar aggregates where grading and other required characteristics can be maintained and contamination can be avoided.

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1.7 PROJECT CONDITIONS

- A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
 - 1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until cast stone has dried, but not less than 7 days after completing cleaning.
- B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified:
 - a. Continental Cast Stone Manufacturing, Inc.

2.2 CAST STONE MATERIALS

- A. General: Comply with ASTM C 1364 and the following:
- B. Portland Cement: ASTM C 150, Type I, containing not more than 0.60 percent total alkali when tested according to ASTM C 114.
- C. Coarse Aggregates: Granite, quartz, or limestone complying with ASTM C 33; gradation as needed to produce required textures and colors as needed to produce required cast stone colors.
- D. Fine Aggregates: Natural sand or crushed stone complying with ASTM C 33, gradation as needed to produce required textures and colors as needed to produce required cast stone colors.
- E. Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black, nonfading, and resistant to lime and other alkalis.
- F. Admixtures: ASTM C494 per manufacturer's recommendation. Do not use admixtures unless specified or approved in writing by Architect.

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1. Do not use admixtures that contain more than 0.1 percent water-soluble chloride ions by mass of cementitious materials. Do not use admixtures containing calcium chloride.
 2. Use only admixtures that are certified by manufacturer to be compatible with cement and other admixtures used.
- G. Reinforcement: Deformed steel bars complying with ASTM A 615/A 615M. Use galvanized or epoxy-coated reinforcement when covered with less than 1-1/2 inches of cast stone material.
1. Epoxy Coating: ASTM A 775/A 775M.
 2. Galvanized Coating: ASTM A 767/A 767M.
- H. Embedded Anchors and Other Inserts: Fabricated from steel complying with ASTM A 36/A 36M, and hot-dip galvanized to comply with ASTM A 123/A 123M.

2.3 CAST STONE UNITS

- A. Provide cast stone units complying with ASTM C 1364 using the vibrant dry tamp method.
- B. Fabricate units with sharp arris and details accurately reproduced with indicated texture on all exposed surfaces, unless otherwise indicated.
1. Slope exposed horizontal surfaces 1:12, unless otherwise indicated.
 2. Provide drips on projecting elements, unless otherwise indicated.
- C. Fabrication Tolerances:
1. Variation in Cross Section: Do not vary from indicated dimensions by more than 1/8 inch.
 2. Variation in Length: Do not vary from indicated dimensions by more than 1/360 of the length of unit or 1/8 inch, whichever is greater, but in no case by more than 1/4 inch.
 3. Warp, Bow, and Twist: Not to exceed 1/360 of the length of unit or 1/8 inch, whichever is greater.
 4. Location of Grooves, False Joints, Holes, Anchorages, and Similar Features: Do not vary from indicated position by more than 1/8 inch on formed surfaces of units and 3/8 inch on unformed surfaces.
- D. Cure units by one of the following methods:
1. Cure units with steam in enclosed curing room at temperature of 105 deg F or above and 95 to 100 percent relative humidity for 6 hours.
 2. Cure units with dense fog and water spray in enclosed warm curing room at 95 to 100 percent relative humidity for 24 hours.
 3. Cure units to comply with one of the following:
 - a. Not less than 5 days at mean daily temperature of 70 deg F or above.
 - b. Not less than 6 days at mean daily temperature of 60 deg F or above.
 - c. Not less than 7 days at mean daily temperature of 50 deg F or above.
 - d. Not less than 8 days at mean daily temperature of 45 deg F or above.

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- E. Acid etch units after curing to remove cement film from surfaces to be exposed to view.
- F. Colors and Textures:
 - a. Burnt Umber
- G. Shapes and Profiles: As indicated on drawings.
- H. Surface Texture.
 - 1. Fine grain texture, similar to natural stone.
 - 2. No bugholes, air voids or other surface blemishes.

2.4 MORTAR MATERIALS

- A. Mortar: ASTM C270, Type N. Match color of cast stone units.

2.5 ACCESSORIES

- A. Anchors: Type and size indicated, fabricated from steel complying with ASTM A 36/A 36M, and hot-dip galvanized to comply with ASTM A 123/A 123M.
- B. Dowels: Round steel bars complying with ASTM A 36/A 36M or ASTM A 615/A 615M, 1/2-inch diameter, and hot-dip galvanized to comply with ASTM A 123/A 123M.
- C. Proprietary Acidic Cleaner: Manufacturer's standard-strength, general-purpose cleaner designed for removing mortar/grout stains, efflorescence, and other construction stains from new masonry surfaces without discoloring or damaging masonry surfaces; expressly approved for intended use by cast stone manufacturer and expressly approved by cleaner manufacturer for use on cast stone and adjacent masonry materials.

2.6 SOURCE QUALITY CONTROL

- A. Employ an independent testing agency to sample and test cast stone units according to ASTM C 1364.
 - 1. Include one test for resistance to freezing and thawing.
 - 2. Select samples at a rate of 3 per 500 cubic feet, with a minimum of 3 per production week.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of cast stone.

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1. Proceed with installation only after unsatisfactory conditions have been corrected.
2. Examine cast stone components for fit and finish before installation.

3.2 SETTING CAST STONE IN MORTAR

- A. Set cast stone components in full bed of mortar, unless otherwise indicated on drawings. Fill vertical joints with mortar.
- B. Make joints 3/8" thick, unless otherwise indicated on drawings.
- C. Set cast stone as indicated on Drawings. Set units accurately in locations indicated with edges and faces aligned according to established relationships and indicated tolerances.
 1. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure units in place.
- D. Drench cast stone components with clear, running water immediately before installation.
- E. Set units in full bed of mortar with full head joints, unless otherwise indicated.
 1. Make joints 3/8 inch, unless otherwise indicated on drawings.
 2. Build anchors and ties into mortar joints as units are set.
 3. Fill dowel holes and anchor slots with mortar.
 4. Fill collar joints solid as units are set.
 5. Build concealed flashing into mortar joints as units are set.
 6. Keep head joints in coping and other units with exposed horizontal surfaces open to receive sealant.
 7. Keep joints at shelf angles open to receive sealant.
 8. Fill vertical joints with mortar.
- F. Rake out joints for pointing with mortar to depths of not less than 3/4 inch. Rake joints to uniform depths with square bottoms and clean sides. Scrub faces of units to remove excess mortar as joints are raked.
- G. Point mortar joints by placing and compacting mortar in layers not greater than 3/8 inch. Compact each layer thoroughly and allow it to become thumbprint hard before applying next layer. Mortar color to match cast stone.
- H. Provide expansion, control, and pressure-relieving joints of widths and at locations indicated. Keep joints free of mortar and other rigid materials.
 1. Form open joint of width indicated, but not less than 3/8 inch.
- I. Prepare joints indicated to receive sealant and apply sealant of type and at locations indicated to comply with applicable requirements in Division 7 Section "Joint Sealants."
 1. Prime cast stone surfaces to receive sealant and install compressible backer rod in joints before applying sealant, unless otherwise indicated.

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3.3 INSTALLATION TOLERANCES

- A. Variation from Plumb: Do not exceed 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
- B. Variation from Level: Do not exceed 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
- C. Variation in Joint Width: Do not vary joint thickness more than 1/8 inch in 36 inches or one-fourth of nominal joint width, whichever is less.
- D. Variation in Plane between Adjacent Surfaces (Lipping): Do not vary from flush alignment with adjacent units or adjacent surfaces indicated to be flush with units by more than 1/16 inch, except due to warpage of units within tolerances specified.

3.4 ADJUSTING AND CLEANING

- A. Remove and replace stained and otherwise damaged units and units not matching approved Samples. Cast stone may be repaired if methods and results are approved by Architect.
- B. Replace units in a manner that results in cast stone matching approved Samples, complying with other requirements, and showing no evidence of replacement.
- C. In-Progress Cleaning: Clean cast stone as work progresses.
 - 1. Remove mortar fins and smears before tooling joints.
 - 2. Remove excess sealant immediately, including spills, smears, and spatter.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed cast stone as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 - 2. Protect adjacent surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
 - 3. Wet surfaces with water before applying cleaners; remove cleaners promptly by rinsing thoroughly with clear water.
 - 4. Clean cast stone by bucket-and-brush hand-cleaning method described in BIA Technical Notes No. 20.
 - 5. Clean cast stone with proprietary acidic cleaner applied according to manufacturer's written instructions.
 - 6. Inspect in accordance with Cast Stone Institute Technical Manual.

END OF SECTION 047200

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SECTION 051200– STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 STANDARDS

- A. Follow the requirements of the Kentucky Transportation Cabinet Standard Specifications for Road and Bridge Construction, current edition, Section 607.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Follow the requirements of the Kentucky Transportation Cabinet Standard Specifications for Road and Bridge Construction, current edition, Division and Section 607.

PART 3 - EXECUTION

3.1 PREPARATION, STORAGE, AND EXCAVATION

- A. Follow the requirements of the Kentucky Transportation Cabinet Standard Specifications for Road and Bridge Construction, current edition, Division and Section 607.

END OF SECTION 051200

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SECTION 051201 – STRUCTURAL STRAND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Structural strand.
- 2. Strand sockets.

- B. Related Sections:

- 1. Section 014000 "Quality Requirements" for independent testing agency procedures and administrative requirements.

1.3 DEFINITIONS

- A. Structural Strand Cables: Structural strand cables shall include structural strand, strand sockets, zinc paste and appurtenances.

1.4 ACTION SUBMITTALS

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

- B. Structural Strand Shop Drawings must include:

- 1. Detailed information regarding the manufacturing procedures for structural strand, including test methods, and a fabrication schedule.
- 2. Detailed information on the procedures involved in assembling and socketing the ends of the strand and the materials and methods used to lock off the strand.
- 3. Methods and equipment for handling, storage, and delivery of all items.
- 4. Details of all connections to any part of the permanent structure.
- 5. Material Safety Data Sheets (MSDS) for strand socketing zinc paste.
- 6. Complete details of the strand erection equipment, erection procedures, and sequence proposed.

- C. Detailed socketing procedure. All socketing shall be performed at the structural strand manufacturer's shop using the zinc poured method.

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1.5 INFORMATIONAL SUBMITTALS

- A. Certificates of compliance for structural strand and strand sockets.

1.6 QUALITY ASSURANCE

- A. The breaking strength of the structural strand shall be tested by full scale breaking tests. For each manufactured length of strand, a test sample shall be cut from the strand production, socketed and tested to determine the modulus of elasticity and the breaking strength of the structural strand. The sockets shall be identical to those specified for the permanent cables, and the socketing procedure used shall be identical to the procedure used for production of permanent cables. The length of the test specimen shall be as approved by the Engineer. The sockets used in the tests shall not be incorporated into the permanent work. The structural strand, when tested to actual breaking strength, shall develop the total minimum breaking strength of not less than 2,896 kips.
- B. Fabrication of Structural Strand:
1. Structural strand shall be manufactured in lengths so that the strands can be fabricated with no splices in the outer wires of any one length of the component strands. Where splices are necessary, they shall be fabricated with butt welds and carefully coated with zinc or 50-50 lead zinc solder after completion of the splice.
 2. The modulus of elasticity of the strand, after prestretching, shall be not less than 22,000 ksi.
 3. Once the manufacture of strand has been started, no changes shall be made as to grade of strand, construction or lay of strand, or other factors which would affect the uniformity of the product.
 4. The first test piece cut from the first manufactured length shall be prestretched in the testing machine. The test piece shall be loaded to 60 percent of the specified minimum breaking strength of the strand for 5 minutes. The load shall then be lowered to 5 percent of the specified minimum breaking strength. The test piece shall have a minimum of 10 strain readings taken in equal increments between 5 percent and 60 percent of the ultimate of the range. If the modulus of the test piece between 10 percent and 60 percent of the breaking strength is a minimum of 22,000 ksi, the same load and time shall be used for prestretching the manufactured lengths.
 5. The strand shall be prestretched to 50 percent of the specified minimum breaking strength for three 15-minute periods. The load shall be lowered to zero between each period.
 6. Measurement and marking shall be carried out under well defined uniform temperature conditions, under cover or at night, and while the strand is held under dead load tension. Allowance shall be made for the anticipated elongation in the sockets.
 7. The length of the socketed structural strand cables shall be accurate within $\pm 1/2''$.
 8. At the time the strand is measured, the Contractor shall place a permanent paint stripe on the top surface of the strand which shall be referenced to eliminate any change in length of the strand due to twisting. Paint marks shall be made for reference marks for the sockets
 9. The finished length shall be accurate to the tolerances given, and each assembly shall be measured to its theoretical length at a measuring tension equivalent to the calculated dead load tension. Final shop measurements and adjustments shall be made in the prestretching rig immediately following proof loading of each assembly to 50 percent of the minimum breaking strength.

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1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification. Protect structural strand and strand sockets from corrosion and deterioration. Repair or replace damaged materials as directed.
- B. Store structural strand and strand sockets in a clean dry area.

PART 2 - PRODUCTS

2.1 STRUCTURAL STRAND CABLES

- A. Structural strand cables shall be zinc-coated and conform to ASTM A586-04a(2009).
- B. Cables shall be prestretched and reference marks for the floorbeams provided on the main cables and for the Esco twitch slides on the handrail cables.

2.2 STRAND SOCKETS

- A. All end fittings shall be zinc-poured open spelter sockets and inspected using non-destructive testing, which shall conform to ASTM E709-08 (2008) “Standard Guide for Magnetic Particle Testing.” Other acceptable non-destructive testing methods will be considered and are subject to the approval of the Engineer.
- B. Zinc for the open spelter sockets shall conform to ASTM B6-09 (2009).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 GENERAL

- A. Protect the structural strand and strand sockets against rust, corrosion, and physical damage.

3.3 STRUCTURAL STRAND CABLES

- A. The structural strand cables shall be hoisted in a manner that does not bend the cables in a curve tighter than 8 feet in diameter.

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3.4 STRAND SOCKETING

- A. All socketing shall be performed at the structural strand manufacturer's shop using the zinc poured method.

3.5 REPAIRS AND PROTECTION

- A. Protect structural strand and strand sockets against physical damage and rust or other results of corrosion at all times.

END OF SECTION 051201

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SECTION 051202 – WIRE ROPE MESH POSTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Wire rope mesh posts.
2. Swaged ferrules and ferrule anchor sockets.

B. Related Sections:

1. Section 014000 "Quality Requirements" for independent testing agency procedures and administrative requirements.

1.3 DEFINITIONS

- A. Wire Rope Mesh Posts: Wire rope mesh posts shall include wire rope, swaged ferrules, ferrule anchor sockets, socketing resin, zinc paste and appurtenances.

1.4 ACTION SUBMITTALS

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

B. Wire Rope Shop Drawings must include:

1. Detailed information regarding the manufacturing procedures for wire rope, including test methods, and a fabrication schedule.
2. Detailed information on the procedures involved in assembling and socketing the ends of the wire rope and the materials and methods used to lock off the wire rope.
3. Methods and equipment for handling, storage, and delivery of all items.
4. Details of all connections to any part of the permanent structure.
5. Material Safety Data Sheets (MSDS) for socketing resin.
6. Complete details of the wire rope erection equipment, erection procedures, and sequence proposed.

- C. Detailed socketing procedure. All socketing shall be performed at the wire rope manufacturer's shop.

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1.5 INFORMATIONAL SUBMITTALS

- A. Certificates of compliance for wire rope, swaged ferrules, and ferrule anchor sockets.

1.6 QUALITY ASSURANCE

- A. The breaking strength of the wire rope shall be tested by full scale breaking tests. For each manufactured length of rope, a test sample shall be cut from the wire rope production, socketed and tested to determine the modulus of elasticity and the breaking strength of the wire rope. The sockets shall be identical to those specified for the permanent cables, and the socketing procedure used shall be identical to the procedure used for production of permanent cables. The length of the test specimen shall be as approved by the Engineer. The sockets used in the tests shall not be incorporated into the permanent work. The wire rope, when tested to actual breaking strength, shall develop the total minimum breaking strength of not less than 13 kips.
- B. Fabrication of Wire Rope:
 - 1. Wire rope shall be manufactured in lengths so that the rope can be fabricated with no splices in the outer wires of any one length of the component strands. Where splices are necessary, they shall be fabricated with butt welds and carefully coated with zinc or 50-50 lead zinc solder after completion of the splice.
 - 2. The modulus of elasticity of the ropes, after prestretching, shall be not less than 20,000 ksi.
 - 3. Once the manufacture of rope has been started, no changes shall be made as to grade of rope, construction or lay of rope, or other factors which would affect the uniformity of the product.
 - 4. The first test piece cut from the first manufactured length shall be prestretched in the testing machine. The test piece shall be loaded to 60 percent of the specified minimum breaking strength of the rope for 5 minutes. The load shall then be lowered to 5 percent of the specified minimum breaking strength. The test piece shall have a minimum of 10 strain readings taken in equal increments between 5 percent and 60 percent of the ultimate of the range. If the modulus of the test piece between 10 percent and 60 percent of the breaking strength is a minimum of 20,000 ksi, the same load and time shall be used for prestretching the manufactured lengths.
 - 5. The rope shall be prestretched to 50 percent of the specified minimum breaking strength for three 15-minute periods. The load shall be lowered to zero between each period.
 - 6. Measurement and marking shall be carried out under well defined uniform temperature conditions, under cover or at night, and while the rope is held under dead load tension. Allowance shall be made for the anticipated elongation in the sockets.
 - 7. The length of the socketed wire rope cables shall be accurate within $\pm 1/8$ ".
 - 8. At the time the rope is measured, the Contractor shall place a permanent paint stripe on the top surface of the rope which shall be referenced to eliminate any change in length of the rope due to twisting. Paint marks shall be made for reference marks for the sockets
 - 9. The finished length shall be accurate to the tolerances given, and each assembly shall be measured to its theoretical length at a measuring tension equivalent to the calculated dead load tension. Final shop measurements and adjustments shall be made in the prestretching rig immediately following proof loading of each assembly to 50 percent of the minimum breaking strength.

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1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification. Protect wire rope, swaged ferrules and ferrule anchor sockets from corrosion and deterioration. Repair or replace damaged materials as directed.
- B. Store wire rope, swaged ferrules and ferrule anchor sockets in a clean dry area.

PART 2 - PRODUCTS

2.1 WIRE ROPE

- A. Wire rope hanger cables shall be zinc-coated and conform to ASTM A603-98(2009)e1.
- B. All wire rope hangers shall be prestretched and cut to the same length.

2.2 SWAGED FERRULES

- A. All end fittings shall be swaged ferrules.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 GENERAL

- A. Protect the wire rope, swaged ferrules and ferrule anchor sockets against rust, corrosion, and physical damage.

3.3 WIRE ROPE MESH POSTS

- A. The wire rope cable shall be hoisted in a manner that does not bend the cable in a curve tighter than 4 feet in diameter.

3.4 SOCKETING

- A. All socketing shall be performed at the wire rope manufacturer's shop.

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3.5 REPAIRS AND PROTECTION

- A. Protect the wire rope, swaged ferrules and ferrule anchor sockets against physical damage and rust or other results of corrosion at all times.

END OF SECTION 051202

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SECTION 051203 – CYCLONE MESH

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Cyclone mesh fencing.
- B. Related Sections:
 - 1. Section 014000 "Quality Requirements" for independent testing agency procedures and administrative requirements.

1.3 DEFINITIONS

- A. Cyclone mesh fencing shall consist of chain link fence fabric, frame members and fittings.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings with all dimensions, details and finishes.

1.5 INFORMATIONAL SUBMITTALS

- A. Certificates of compliance for chain link fence fabric.

1.6 QUALITY ASSURANCE

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification. Repair or replace damaged materials as directed.

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PART 2 - PRODUCTS

2.1 CHAIN LINK FENCE FABRIC

- A. Wire: Zinc coated per ASTM A392 Class 1, galvanized after weaving (GAW). The weight of zinc coating shall not be less than 1.2 ounces per square foot.
- B. Size: Helically wound and woven to height of twelve (12) feet with 2" ± 1/8" diamond mesh, nine (9) gauge, with a core wire diameter of 0.148" and a break load of 1290 lbf (pounds force).
- C. Selvage of fabric shall be twisted at top and knuckled at bottom.

2.2 STEEL FENCE FRAME MEMBERS

- A. Material: ASTM A500 Grade B, Fy = 35 KSI
- B. Size:
 - 1. Pipe 6 Std. – End posts and corner posts
 - 2. Pipe 3 Std. – Line Posts
 - 3. Pipe 1¼ Std. – Braces and Rails
- C. Coating:
 - 1. External coating per ASTM F 1043 Type A; internal coating per ASTM F 1043 Type A. Apply all coatings after welding

2.3 FITTINGS

- A. Chain link fence fittings shall conform to ASTM F 626. All ferrous metal fittings are to be galvanized.
- B. Post caps: Steel, cast iron, or aluminum alloy. Caps must be weatherproof to prevent moisture intrusion into post. Top with arm to be provided when barbed wire is specified. Intermediate or line post tops to have loop for top rail when specified.
- C. Rail ends: Formed steel or iron, designed to provide secure connection of top rails to terminal post and brace or other rails to terminal and intermediate posts.
- D. Sleeves: Lengths of top rails to be connected using 6" (152 mm) sleeves that allow for expansion or contraction of the rail.
- E. Tie Wire: 9 gauge [0.148" (3.76 mm)] galvanized steel or aluminum for attachment of chain link fabric to rails. Hog rings attach fabric to tension wire to be 12 -1/2 GA [0.0985" (2.502 mm)].
- F. Fabric bands and brace bands are to be pressed steel.
- G. Tension (stretcher) bars made of one continuous piece of steel or aluminum, 3/16" x 3/4" (4.76 mm x 19 mm). Provide one bar per end or gate post and two bars per corner or pull post

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- H. Tension wire: Galvanized steel wire, 7 gauge, (0.177"), having a tensile strength of 75,000 psi (517 MPa).
- I. Truss rods & tightener: Rod minimum diameter 3/8".
- J. Fasteners: All nuts and bolts to be galvanized.
- K. Caps and rail ends to be of the type that will not permit access by insects or shall be filled to the depth of 6" with urethane foam.

PART 3 - EXECUTION

3.1 FIELD MEASUREMENTS

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

3.2 INSTALLATION

- A. Posts, tie rods, tension wires and brace rails shall be installed on the secure side of the fence. Chain link fabric shall be installed on the opposite (non-secure) side and attached so that fabric remains in tension after pulling force is released. Leave approximately 2" (50 mm) between finish grade and bottom selvage. Attach fabric with wire ties to line posts at 15" on center and to rails, braces, and tension wire at 24" on center.

3.3 GENERAL

- A. Protect chain link fence fabric, frame members and fittings against rust, corrosion, and physical damage.

END OF SECTION 051203

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SECTION 051204 – ELASTOMERIC PADS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Elastomeric pads.
- B. Related Sections:
 - 1. Section 014000 "Quality Requirements" for independent testing agency procedures and administrative requirements.

1.3 DEFINITIONS

- A. As used in these Specifications, the word “elastomer” or “elastomeric” means “rubber”; the words are interchangeable.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Sample: Furnish one sample elastomeric pad.

1.5 INFORMATIONAL SUBMITTALS

- A. Certificates of compliance for elastomeric pads.

1.6 QUALITY ASSURANCE

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification. Repair or replace damaged materials as directed.

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PART 2 - PRODUCTS

2.1 ELASTOMERIC PADS

- A. Molded elastomeric compound, or cut from previously molded strips or slabs, or extruded and cut to length, with smooth surfaces and cut edges.

2.2 ELASTOMERIC COMPOUND/ELASTOMER

- A. Virgin crystallization-resistant polychloroprene as the raw elastomer. Physical requirements of the elastomeric compound include the following:
 - 1. Physical Properties
 - a. Hardness: ASTM D2240, Type D durometer, 60, plus or minus 6.
 - b. Tensile Strength: ASTM D412, 2500 psi minimum.
 - c. Ultimate Elongation: ASTM D412, 350 percent minimum.
 - 2. Heat Resistance: ASTM D573, 48 hours at 212 degrees F.
 - a. Change in durometer hardness: plus 15 points maximum.
 - b. Change in tensile strength: minus 15 percent maximum.
 - c. Change in ultimate elongation: minus 40 percent maximum.
 - 3. Compression Set: ASTM D395, Method B, 22 hours at 212 degrees F: 35 percent maximum.
 - 4. Ozone Cracking: ASTM D1149, 100 pphm ozone in air by volume, 20 percent strain, 104 plus or minus 2 degrees F, 100 hours mounting procedure A in accordance with ASTM D518: no cracks.
 - 5. Adhesion: ASTM D429, Method B, bond made during vulcanization: 40 pounds per square inch.
- B. Adhesive for the installation of bearing pads to concrete and steel bearing surfaces shall be a solvent-free adhesive as appropriate for this particular installation.

2.3 FABRICATION

- A. Elastomeric pads shall conform to the applicable requirements of ASTM D4014.
- B. Elastomeric pads shall be molded individually, or cut from previously molded strips or slabs, or extruded and cut to size. Cutting shall produce a smooth surface and no heating of the elastomer.

PART 3 - EXECUTION

3.1 FIELD MEASUREMENTS

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

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3.2 INSTALLATION

- A. Install elastomeric bearing pads at locations indicated in accordance with indicated details.
- B. Apply adhesive to clean concrete or steel bearing surface to a minimum thickness of 1/8 inch, and set bearing pads on adhesive bed as indicated.

END OF SECTION 051204

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SECTION 055213 - PIPE AND TUBE RAILINGS – ADD-ALT.NO.2 – GALVANIZED FINISH

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Steel pipe and tube railings.

1.3 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.4 ACTION SUBMITTALS

- A. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
- B. Samples: For each type of exposed finish required.
 - 1. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters.
 - 2. Fittings and brackets.
 - 3. Assembled Sample of railing system, made from full-size components, including top rail, post, handrail, and infill. Sample to be full height.
 - a. Show method of connecting and finishing members at intersections.
- C. Delegated-Design Submittal: For railings, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

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1.5 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.

1.6 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

1.8 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Steel Pipe and Tube Railings:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Wagner, R & B, Inc.
- B. Source Limitations: Obtain each type of railing from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design railings, including attachment to building construction.

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- B. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - 1. Handrails and Top Rails of Guards:
 - a. Uniform load of 50 lbf/ ft. applied in any direction.
 - b. Concentrated load of 200 lbf applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
 - 2. Infill of Guards:
 - a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft..
 - b. Infill load and other loads need not be assumed to act concurrently.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F.

2.3 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
- B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.

2.4 STEEL AND IRON

- A. Tubing: ASTM A 500 (cold formed) or ASTM A 513.
- B. Pipe: ASTM A 53/A 53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.
 - 1. Provide galvanized finish for exterior installations and where indicated.
- C. Plates, Shapes, and Bars: ASTM A 36/A 36M.

2.5 FASTENERS

- A. General: Provide the following:
 - 1. Hot-Dip Galvanized Railings: Type 304 stainless-steel or hot-dip zinc-coated steel fasteners complying with ASTM A 153/A 153M or ASTM F 2329 for zinc coating.
 - 2. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

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- B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.
- C. Fasteners for Interconnecting Railing Components:
 - 1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless otherwise indicated.

2.6 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Etching Cleaner for Galvanized Metal: Complying with MPI#25.
- C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- D. Shop Primers: Provide primers that comply with Section 099600 "High-Performance Coatings."
- E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.
- F. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- G. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.
 - 1. Water-Resistant Product: At exterior locations and where indicated provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

2.7 FABRICATION

- A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.
- B. Shop assemble railings to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

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- C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- D. Form work true to line and level with accurate angles and surfaces.
- E. Fabricate connections that are exposed to weather in a manner that excludes water. Provide weep holes where water may accumulate.
- F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
- G. Connections: Fabricate railings with welded connections unless otherwise indicated.
- H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove flux immediately.
 - 4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
- I. Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
 - 1. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method.
- J. Form Changes in Direction as Follows:
 - 1. As detailed.
- K. For changes in direction made by bending, use jigs to produce uniform curvature for each repetitive configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- L. Close exposed ends of railing members with prefabricated end fittings.
- M. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.
- N. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.
- O. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

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2.8 STEEL AND IRON FINISHES

A. Galvanized Railings:

1. Hot-dip galvanize exterior steel railings, including hardware, after fabrication.
2. Comply with ASTM A 123/A 123M for hot-dip galvanized railings.
3. Comply with ASTM A 153/A 153M for hot-dip galvanized hardware.
4. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
5. Fill vent and drain holes that are exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

B. For galvanized railings, provide hot-dip galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.

C. Preparing Galvanized Railings for Shop Priming: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner. Follow paint manufacturer's instructions. First Solvent Clean per SSPC-SP1 and apply a test patch. Allow paint to dry at least one week before testing adhesion. If adhesion is poor, brush blasting per SSPC-SP7 is necessary to remove these treatments.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

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

B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

1. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

C. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

D. Adjust railings before anchoring to ensure matching alignment at abutting joints.

E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

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3.2 RAILING CONNECTIONS

- A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.
- B. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6 inches of post.

3.3 ANCHORING POSTS

- A. Form or core-drill holes not less than 5 inches deep and 3/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions.
- B. Leave anchorage joint exposed with anchoring material flush with adjacent surface.

3.4 ATTACHING RAILINGS

- A. Anchor railing ends at walls with round flanges anchored to wall construction and welded to railing ends.

3.5 ADJUSTING AND CLEANING

- A. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099600 "High-Performance Coatings."
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas, and repair galvanizing to comply with ASTM A 780/A 780M.

END OF SECTION 055213

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SECTION 055213 - PIPE AND TUBE RAILINGS –BASE BID

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Steel pipe and tube railings.

1.3 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.4 ACTION SUBMITTALS

- A. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
- B. Samples: For each type of exposed finish required.
 - 1. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters.
 - 2. Fittings and brackets.
 - 3. Assembled Sample of railing system, made from full-size components, including top rail, post, handrail, and infill. Sample to be full height.
 - a. Show method of connecting and finishing members at intersections.
- C. Delegated-Design Submittal: For railings, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

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1.5 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.

1.6 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

1.8 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Steel Pipe and Tube Railings:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Wagner, R & B, Inc.
- B. Source Limitations: Obtain each type of railing from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design railings, including attachment to building construction.

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- B. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - 1. Handrails and Top Rails of Guards:
 - a. Uniform load of 50 lbf/ ft. applied in any direction.
 - b. Concentrated load of 200 lbf applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
 - 2. Infill of Guards:
 - a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft..
 - b. Infill load and other loads need not be assumed to act concurrently.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F.

2.3 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
- B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.

2.4 STEEL AND IRON

- A. Tubing: ASTM A 500 (cold formed) or ASTM A 513.
- B. Pipe: ASTM A 53/A 53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.
- C. Plates, Shapes, and Bars: ASTM A 36/A 36M.

2.5 FASTENERS

- A. General: Provide the following:
 - 1. Ungalvanized-Steel Railings: Plated steel fasteners complying with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5 for zinc coating.
 - 2. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

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- B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.
- C. Fasteners for Interconnecting Railing Components:
 - 1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless otherwise indicated.

2.6 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Shop Primers: Provide primers that comply with Section 099600 "High-Performance Coatings."
- C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.
- D. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- E. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.
 - 1. Water-Resistant Product: At exterior locations and where indicated provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

2.7 FABRICATION

- A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.
- B. Shop assemble railings to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
- C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- D. Form work true to line and level with accurate angles and surfaces.

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- E. Fabricate connections that are exposed to weather in a manner that excludes water. Provide weep holes where water may accumulate.
- F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
- G. Connections: Fabricate railings with welded connections unless otherwise indicated.
- H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove flux immediately.
 - 4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
- I. Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
 - 1. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method.
- J. Form Changes in Direction as Follows:
 - 1. As detailed.
- K. For changes in direction made by bending, use jigs to produce uniform curvature for each repetitive configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- L. Close exposed ends of railing members with prefabricated end fittings.
- M. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.
- N. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.
- O. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

2.8 STEEL AND IRON FINISHES

- A. For nongalvanized-steel railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves; however, galvanize anchors to be embedded in exterior concrete or masonry.

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- B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with requirements indicated below:
 - 1. Exterior Railings: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
- C. Primer Application: Apply shop primer to prepared surfaces of railings unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.
- D. Shop Primer: High Build epoxy marine coating, low gloss.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Fit exposed connections together to form tight, hairline joints.
- B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
 - 1. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
 - 2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
 - 3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.
- C. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.
- D. Adjust railings before anchoring to ensure matching alignment at abutting joints.
- E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.2 RAILING CONNECTIONS

- A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.
- B. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2

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inches beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6 inches of post.

3.3 ANCHORING POSTS

- A. Form or core-drill holes not less than 5 inches deep and 3/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions.
- B. Leave anchorage joint exposed with anchoring material flush with adjacent surface.

3.4 ATTACHING RAILINGS

- A. Anchor railing ends at walls with round flanges anchored to wall construction and welded to railing ends.

3.5 ADJUSTING AND CLEANING

- A. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099600 "High-Performance Coatings."

END OF SECTION 055213

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SECTION 061063 - EXTERIOR ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Exposed lumber framing, including roof rafters.
 - 2. Miscellaneous framing with dimension lumber, including studs, blocking and furring.
 - 3. Exposed lumber framing and decking.
- B. Related Sections include:
 - 1. Section 061600 "Sheathing."
 - 2. Section 061801 "Glulam Structural Timber Systems."
 - 3. Section 062013 "Exterior Finish Carpentry."
 - 4. Section 099300 "Staining and Transparent Finishing" for field-applied wood staining.

1.3 DEFINITIONS

- A. Exposed Framing: Framing not concealed by other construction.
- B. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.
- C. Lumber grading agencies, and the abbreviations used to reference them, include the following:
 - 1. NeLMA: Northeastern Lumber Manufacturers' Association.
 - 2. NLGA: National Lumber Grades Authority.
 - 3. RIS: Redwood Inspection Service.
 - 4. SPIB: The Southern Pine Inspection Bureau.
 - 5. WCLIB: West Coast Lumber Inspection Bureau.
 - 6. WWPAA: Western Wood Products Association.

1.4 SUBMITTALS

- A. Samples: For each type of member and factory-fabricated product, framing anchor and connector. Indicate component materials and dimensions and include construction and application details.

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1. Provide 12" long sample of framing member, dressed as specified.

B. Material Certificates:

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

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

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store materials under cover and protected from weather and contact with damp or wet surfaces. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.
- B. Handle and store plastic lumber to comply with manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 LUMBER, GENERAL

- A. Lumber: Comply with DOC PS 20 and with applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by ALSC's Board of Review. Provide lumber graded by an agency certified by ALSC's Board of Review to inspect and grade lumber under the rules indicated.
 1. Factory mark each item with grade stamp of grading agency.
 2. For items that are exposed to view in the completed Work, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.
 3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry wood products.
 4. Provide dressed lumber, S4S, unless otherwise indicated.

2.2 WOOD PRESERVATIVE TREATED LUMBER

- A. Preservative Treatment by pressure process for Site Decks: AWPA C2, except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWPA C31 with inorganic boron (SBX)
 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

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2. Use preservative solution without water repellents or substances that might interfere with application of indicated finishes.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19%.

C. Application: Treat all rough carpentry associated with Site Wood Decks

2.3 DIMENSION LUMBER FRAMING, GENERAL

A. Maximum Moisture Content: 19 percent.

B. Exposed Exterior Framing and Decking indicated to Receive a Stained or Natural Finish: Provide material hand-selected for uniformity of appearance and freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot-holes, shake, splits, torn grain, and wane.

C. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

D. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.4 RAFTER AND BENCH FRAMING

A. Provide dimensional lumber framing complying with the following requirements, according to grading rules of grading agency indicated:

1. Species and Grade: Southern pine No. 2; SPIB, or as indicated.

2.5 PARTITIONS AND MISCELLANEOUS FRAMING

A. Provide miscellaneous framing complying with the following requirements, according to grading rules of grading agency indicated:

1. Species and Grade: Southern pine No. 2; SPIB, or as indicated.

2.6 FASTENERS AND ANCHORS

A. General: Provide fasteners and anchors of size and type indicated that comply with requirements specified in this article for material and manufacture. Provide nails or screws, in sufficient length, to penetrate not less than 1-1/2 inches into wood substrate. Provide products with allowable design loads, as published by manufacturer, that meet or exceed those indicated or required by code.

1. For redwood, use stainless steel or hot-dip galvanized steel fasteners.

2. Where carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide hot-dip galvanized fasteners.

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- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Lag Screws: ASME B18.2.1.
- F. Carbon-Steel Bolts: ASTM A 307 with ASTM A 563 hex nuts and, where indicated, flat washers all hot-dip zinc coated.
- G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
 - 1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
- H. Adhesives for Gluing furring to Concrete: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

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

3.3 INSTALLATION, GENERAL

- A. Set exterior rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit exterior rough carpentry to other construction; scribe and cope as needed for accurate fit.
- B. Framing Standard: Comply with AF&PA's "Details for Conventional Wood Frame Construction" unless otherwise indicated.
- C. Metal Framing Anchors: Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

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- D. Do not splice structural members between supports unless otherwise indicated.
- E. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
- F. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- G. Securely attach exterior rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
- H. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.

3.4 EXPOSED RAFTER FRAMING INSTALLATION

- A. Rafters: Install exposed rafters with crown side up fully supported on beams and purlins. Use metal anchors as shown on drawings. Provide continuous members, unless otherwise indicated.

3.5 WOOD BLOCKING, AND NAILER INSTALLATION

- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

3.6 WOOD FURRING INSTALLATION

- A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.

END OF SECTION 061063

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SECTION 061540 – WOOD BRIDGE DECKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Wood bridge decking.
 - 2. Fasteners.
- B. Related Sections:
 - 1. Section 014000 "Quality Requirements" for independent testing agency procedures and administrative requirements.

1.3 DEFINITIONS

- A. Wood bridge decking shall consist of 2"x8" ipe secured with carriage bolts.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings must include:

1.5 INFORMATIONAL SUBMITTALS

- A. Certificates of compliance for wood decking.

1.6 QUALITY ASSURANCE

- A. Lumber Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.
- B. Lumber Vendor Qualifications: A vendor that is certified for chain of custody by an FSC-accredited certification body.

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1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store materials under cover and protected from weather and contact with damp or wet surfaces. Stack lumber flat with spacers between each bundle to provide air circulation. Stacks shall be kept directly off solid surfaces at least 4". Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD BRIDGE DECKING

- A. Wood decking shall be 2"x8" ipe (lapacho subspecies) with a maximum moisture content of 12%.
- B. Wax fresh cut ends of wood decking as soon as possible after cutting. End seal with a Paraffin wax based product or equal.
- C. Wood decking shall be secured with a minimum of (2)½"φ carriage bolts at every support. Carriage bolt heads shall be countersunk 1/4 inch.
- D. All holes in the ipe decking shall be pre-drilled.
- E. Coordinate bolt hole locations with steel fabricator.

2.2 FASTENERS

- A. Wood decking shall be secured with a minimum of (2)½"φ carriage bolts at every support. Carriage bolt heads shall be countersunk 1/4 inch. Carriage bolts shall comply with ASTM F593 with ASTM F594 hex nuts and flat washers. Carriage bolts, hex nuts and washers shall be stainless steel.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

- A. Set work to required levels and lines, with members plumb, true to line, cut, and fitted. Fit work to other construction; scribe and cope as needed for accurate fit

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3.3 GENERAL

- A. Protect the wood decking against physical damage and protect carriage bolts against rust, corrosion, and physical damage.

END OF SECTION 061540

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SECTION 061600 - SHEATHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

1. Wall sheathing.
2. Roof sheathing.
3. Building wrap.

- B. Related Requirements:

1. Section 061063 "Exterior Rough Carpentry".

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.
2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
3. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

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PART 2 - PRODUCTS

2.1 WOOD PANEL PRODUCTS

- A. Plywood: Either DOC PS 1 or DOC PS 2 unless otherwise indicated.
- B. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.
- C. Factory mark panels to indicate compliance with applicable standard.

2.2 PRESERVATIVE-TREATED PLYWOOD

- A. Preservative Treatment by Pressure Process: AWWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.
- C. Application: Treat items indicated on Drawings.

2.3 WALL SHEATHING

- A. Plywood Wall Sheathing: Exterior, Structural I sheathing.
 - 1. Span Rating: Not less than 16/0.

2.4 ROOF SHEATHING

- A. Plywood Roof Sheathing: Exterior, Structural I sheathing.
 - 1. Span Rating: Not less than 16/0.

2.5 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. For roof and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Nails, Brads, and Staples: ASTM F 1667.

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- C. Power-Driven Fasteners: NES NER-272.
- D. Wood Screws: ASME B18.6.1.

2.6 WEATHER-RESISTANT BUILDING PAPER

- A. Building Wrap: Air-retarder sheeting made from polyolefins; cross-laminated films, woven strands, or spun-bonded fibers; coated or uncoated; with or without perforations; and complying with ASTM E 1677, Type I.
 - 1. Thickness: Not less than 3 mils.
 - 2. Permeance: Not less than 10 perms.
 - 3. Flame-Spread Index: 25 or less per ASTM E 84.
 - 4. Allowable Exposure Time: Not less than three months.
 - 5. Products: Subject to compliance with requirements, provide one of the following:
 - a. Dow Chemical Company (The); Styrofoam Weathermate Plus Brand Housewrap.
 - b. DuPont (E. I. du Pont de Nemours and Company); Tyvek CommercialWrap.
 - c. Raven Industries Inc.; Rufco-Wrap.
 - d. Reemay, Inc.; Typar HouseWrap.
- B. Building Wrap Tape: Pressure-sensitive plastic tape recommended by building wrap manufacturer for sealing joints and penetrations in building wrap.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."
- D. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.

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- E. Coordinate wall and roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- G. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 WOOD STRUCTURAL PANEL INSTALLATION

- A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.
- B. Fastening Methods: Fasten panels as indicated below:
 - 1. Wall and Roof Sheathing:
 - a. Nail to wood framing.
 - b. Space panels 1/8 inch apart at edges and ends.

END OF SECTION 061600

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SECTION 061801 - GLULAM STRUCTURAL TIMBER SYSTEMS

PART 1 GENERAL

1.1 WORK INCLUDED

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to work specified in this section.
- B. This section includes sole source supply of all items related to the design and installation of complete Glulam Structural Timber Systems. The systems include all glulam beams, columns, and frames; all tongue and groove laminated wood decking; all decking to beam connections, all beam to beam connections, all beam to column connections, and all column to footing connections, all related materials, labor, tools, equipment and services necessary for the design, manufacture, fabrication, delivery to the site, unloading, handling, storing and erecting of complete glulam structural timber systems as shown on the drawings, and/or specified herein.

1.2 RELATED DOCUMENTS

- A. Comply with the provisions of the latest editions of the following Codes, Specifications and Standards, except as otherwise shown or specified herein.
 - 1. ANSI/AITC A190.1 Standard for Dimensions of Structural Glued Laminated Timber
 - 2. AITC 117 Design Specifications for Structural Glued Laminated Timber of Softwood Species
 - 3. AITC 109 Standard for Preservative Treatment of Structural Glued Laminated Timber
 - 4. AITC 110 Standard Appearance Grades for Structural Glued Laminated Timber
- B. Coordinate the requirements of this section with the general requirements of Section 061800 –Glued Laminated Construction.

1.3 SHOP DRAWINGS

- A. Shop drawings shall be checked by the contractor and submitted to the Architect/Engineer for review in conformance with "Special Provisions" and General Notes before fabrication is begun.
- B. The shop drawings shall include the following:
 - 1. Complete details and schedules for the fabrication of each member and for

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each member to member connection, including all decking to beam connections, all beam to beam connection, all beam to column connections, and all column to footing connections.

2. Complete details, schedules, procedures and diagrams showing sequence of erection.
3. Each member shown on the shop drawings shall be marked in such manner that the member designations on the drawings coincide with the member designations on the member in the field.
4. Complete loads that the glulam members will impose on the footings. These loads shall be submitted for verification of footing and pier design prior to construction of any foundations.

PART 2 MATERIALS

2.1 GLULAM MEMBER MATERIALS

- A. Unless otherwise shown or specified, all glulam structural members shall be manufactured from southern pine and appearance shall meet the requirements of premium grade as described in AITC 110.
- B. Unless otherwise shown or specified, all tongue and groove laminated wood decking shall be nominal 3 inches thick, decorative grade, manufactured from southern pine.
- C. All glulam connections shall be of galvanized steel construction, sufficiently sized and with sufficient number and size of bolts as required by design.
- D. High strength threaded fasteners shall be heavy hexagon structural bolts with heavy hexagon nuts and washers. Split rings and shear plates may be used in bolted connections as required by design.

PART 3 EXECUTION

3.1 FABRICATION

- A. Fabricate all members to the required dimensions for proper fit up and in accordance with dimensions and the connection details indicated on the approved shop drawings.
- B. Properly mark and match-mark all materials for field assembly. Fabricate for delivery sequence which will expedite erection and minimize the field handling of materials.

3.2 CONNECTIONS

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- A. Connection of tongue and groove laminated wood decking to glulam beams shall be as indicated on the approved shop drawings.
- B. Bolted steel plate connections of glulam member to glulam member and of glulam member to footing shall be as detailed on the approved shop drawings.
- C. Details shown on the plans are to illustrate general methods of connection and do not necessarily include all pieces required to complete the work. Such pieces are to be furnished as specified and/or required to complete the work. Connection configuration and details shall be the responsibility of the Structural Engineer, retained by the supplier, who is responsible for the design of the complete glulam structural timber system.
- D. Moment connections (beam to column and column to footing) shall be utilized as required by design to limit the lateral sidesway deflection to 1/360 of the column height.
- E. The entire Glulam Structural Timber System design including design of all member sizes, laminated decking, decking connections to beams, beam to beam connections, beam to column connections, and column to footing connections shall be provided by a single Structural Engineer registered in the state of Kentucky, retained by the supplier. All design shall be performed in accordance with the referenced codes and the design loads indicated on the drawings. All design calculations and shop drawings shall be duly stamped by the Registered Structural Engineer and submitted for review by the Architect/Engineer. Failure to submit stamped shop drawings and stamped calculations shall be sufficient cause for rejection of shop drawings. The Contractor shall be liable for the dimension, fit, tolerances, fabrication, and erection.

3.5 ERECTION

- A. Erect all glulam members to the lines and positions shown on the drawings and with uniform and close fitting joints.
- B. Maintain work in a safe and stable condition during erection. Provide temporary shoring and bracing members as required, with connections of sufficient strength to bear imposed loads. Remove temporary members and connections when permanent members are in place and final connections are made. Provide temporary guy lines to achieve proper alignment and stability of the structure as erection proceeds. Connections of temporary shoring and bracing to permanent members shall be done in such a way as not to mar or deface the permanent members.
- C. Before starting the work, this contractor shall inspect and approve work done under Section 033000. It shall be the responsibility of the contractor under Section 033000 to correct any work not acceptable to receive work to be done under this Section.

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3.6 FIELD ASSEMBLY

- A. Set glulam columns and beams accurately to lines and elevations indicated. Align and adjust the various members forming a part of the complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces which will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

3.7 QUALITY CONTROL

- A. Provide access for Architect/Engineer to places where glulam structural timbers are being fabricated or produced so that inspections can be accomplished.
- B. The Architect may inspect the glulam structural members at the plant before shipment; however, Architect reserves right, at any time before final acceptance, to reject material not complying with specified requirements.

END OF SECTION 061801

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SECTION 062013 - EXTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Exterior wood trim, including milled window frames.
 - 2. Lumber siding, vertical and horizontal.
- B. Related Requirements:
 - 1. Section 061063 "Exterior Rough Carpentry."
 - 2. Section 099300 "Staining and Transparent Finishing" for stain application on exposed framing.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors and include construction and application details.
- B. Samples for Initial Selection: For each type of product involving selection of colors, profiles, or textures.
- C. Samples for Verification:
 - 1. For each species and cut of lumber and siding products.

1.4 INFORMATIONAL SUBMITTALS

- A. Compliance Certificates:
 - 1. For lumber that is not marked with grade stamp.
- B. Sample Warranties: For manufacturer's warranties.

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1.5 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation. Protect materials from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

1.6 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecast weather conditions permit work to be performed and at least one coat of specified finish can be applied without exposure to rain, snow, or dampness.
 - 1. For exterior ornamental wood columns, comply with manufacturer's written instructions and warranty requirements.
- B. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.
 - 1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

1.7 WARRANTY

- A. Manufacturer's Warranty for Siding and Trim: Manufacturer agrees to repair or replace siding that fails in materials or workmanship within specified warranty period. Failures include, but are not limited to, deformation or deterioration beyond normal weathering.
 - 1. Warranty Period for Factory-Applied Finish: Five years from date of Substantial Completion.
 - 2. Warranty Period for Siding and Trim (Excluding Finish): 25 years from date of Substantial Completion.

PART 2 - PRODUCTS

- A. Lumber: DOC PS 20 and the following grading rules:
 - 1. NLGA: National Lumber Grades Authority, "Standard Grading Rules for Canadian Lumber."
 - 2. WCLIB: West Coast Lumber Inspection Bureau, Standard No. 17, "Grading Rules for West Coast Lumber."
 - 3. WWPA: Western Wood Products Association, "Western Lumber Grading Rules."
- B. Factory mark each piece of lumber with grade stamp of inspection agency indicating grade, species, moisture content at time of surfacing, and mill.

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1. For exposed lumber, omit grade stamp and provide certificates of grade compliance issued by inspection agency.

2.2 EXTERIOR TRIM

A. Lumber Trim for Semitransparent-Stained Finish:

1. Species and Grade: Western red cedar, Grade A Clear; NLGA (200B), WCLIB (102C), or WWPA.
2. Maximum Moisture Content: 15 percent.
3. Finger Jointing: Not allowed on siding.
4. Face Surface: Surfaced (smooth).

B. Moldings and milled shapes for Semitransparent-Stained Finish: WMMPA WM 4, N-grade wood moldings, without finger jointing. Made from kiln-dried stock.

1. Species: Western red cedar.
2. Refer to Drawings for profiles.

2.3 LUMBER SIDING, VERTICAL

A. Provide kiln-dried lumber siding complying with DOC PS 20.

B. Species and Grade: Grade A Clear western red cedar; NLGA, WCLIB, or WWPA.

1. Pattern: Channel Rustic Siding
2. Texture: Smooth Face Out
3. Size: 1 by nominal boards, with 1-1/2 inch reveal channel. Refer to drawings for random widths and layout pattern.
4. Application: Vertical
5. Finish: Transparent Stain

2.4 MISCELLANEOUS MATERIALS

A. Fasteners for Exterior Finish Carpentry: Provide nails or screws, in sufficient length to penetrate not less than 1-1/2 inches into wood substrate.

1. For all applications, provide stainless-steel or hot-dip galvanized-steel splitless spiral or ring shank fasteners.

B. Wood Glue: Waterproof resorcinol glue recommended by manufacturer for exterior carpentry use.

C. Flashing: Comply with requirements in Division 07 Section "Sheet Metal Flashing and Trim" for flashing materials installed in exterior finish carpentry.

D. Sealants: Acrylic Latex or Acrylic Silicone, complying with ASTM C 834 Type C, Grade NF and with applicable requirements in Division 07 Section "Joint Sealants," recommended by sealant

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manufacturer and manufacturer of substrates for intended application. Do not use pure silicone or clear caulks.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. BASF Building Systems; Sonolac.
 - b. Pecora Corporation; AC-20+.
 - c. Tremco Incorporated; Tremflex 834.

2.5 FABRICATION

- A. Back out or kerf backs of standing and running trim wider than 5 inches, except members with ends exposed in finished work.
- B. Ease edges of lumber less than 1 inch in nominal thickness to 1/16-inch radius and edges of lumber 1 inch or more in nominal thickness to 1/8-inch radius.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Examine finish carpentry materials before installation. Reject materials that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates of projections and substances detrimental to application.
- B. Stain lumber and moldings, including both faces and edges, unless factory stained. Cut to required lengths and stain ends. Comply with requirements in Division 099300 Section "Staining and Transparent Finishing".

3.3 INSTALLATION, GENERAL

- A. Do not use materials that are unsound, bowed, checked, cracked, warped, improperly treated or finished, inadequately seasoned, or too small to fabricate with proper jointing arrangements.

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1. Do not use manufactured units with defective surfaces, sizes, or patterns.
- B. Install exterior finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.
 1. Scribe and cut exterior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
 2. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining exterior finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
 3. Coordinate exterior finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate exterior finish carpentry.

3.4 FRAMES AND TRIM INSTALLATION

- A. Install flat-grain lumber with bark side exposed to weather.
- B. Install trim with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches long except where necessary.
 1. Use scarf joints for end-to-end joints.
 2. Stagger end joints in adjacent and related members.
- C. Fit exterior joints to exclude water. Cope at returns and miter at corners to produce tight-fitting joints with full-surface contact throughout length of joint. Plane backs of casings to provide uniform thickness across joints, where necessary for alignment.
- D. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.

3.5 SIDING INSTALLATION

- A. Install siding to comply with manufacturer's written instructions, drawings and warranty.
- B. Lap Siding: Install panels with edges over framing, sheathing, furring or blocking and drain wrap. Leave 1/16-inch gap between adjacent panels and 1/8-inch gap at perimeter, openings, and horizontal joints unless otherwise recommended by panel manufacturer. Seal butt joints at inside and outside corners and at trim locations and openings.
 1. For vertical siding, install over vented horizontal 1x furring. Nail at 32 inches o.c. with sheathing, and 24 inches o.c. without sheathing, unless manufacturer recommends closer spacing. Conceal fasteners to greatest practical extent by placing in grooves of siding pattern or by concealing with applied trim or battens as detailed. Do not nail through overlapping pieces.

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2. For horizontal siding, install over vented vertical 1x furring aligned with studs. Start with bottom course and work up. Allow 1/8" gap between pieces. Face nail 16 inches o.c. with one nail one inch up from the lap. Do not nail through laps.
- C. Flashing: Install metal flashing as indicated on Drawings and as recommended by siding manufacturer. Install continuous metal flashing at sills and openings.
- D. Finish: Apply finish within two weeks of installation.

3.6 ADJUSTING

- A. Replace exterior finish carpentry that is damaged or does not comply with requirements or as directed by architect. Exterior finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing. Adjust joinery for uniform appearance.

3.7 CLEANING

- A. Clean exterior finish carpentry on exposed and semiexposed surfaces. Touch up finishes to restore damaged or soiled areas.

3.8 PROTECTION

- A. Protect installed products from damage from weather and other causes during construction.
- B. Remove and replace finish carpentry materials that are wet, moisture damaged, and mold damaged.
 1. Indications that materials are wet, mold or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape, fuzzy or splotchy surface contamination.

END OF SECTION 062013

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SECTION 071416 - COLD FLUID-APPLIED WATERPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes: Installation of waterproofing membrane on surfaces indicated on the plans, consisting of preparation of new concrete surfaces, sealing of cracks and joints, and application of cold, fluid-applied waterproofing membrane
- B. Related Section:
 - 1. Section 033000- Cast-In-Place Concrete
 - 2. Section 044200- Exterior Stone Cladding.

1.3 REFERENCES

- A. ASTM C 836 High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for use with Separate Wearing Course.

1.4 SYSTEM DESCRIPTION

- A. Product provided by this Section is a coal-tar free polyurethane liquid or single-component, polymer-modified liquid designed to create a seamless waterproofing membrane.

1.5 SUBMITTALS

- A. General: Submit in accordance with Section 123300 – Submittal Procedures.
- B. Product Data: For each type of product indicated. Include manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties of waterproofing.
- C. Subcontractor's approval by Manufacturer: Submit document stating manufacturer's acceptance of subcontractor as an Approved Applicator for the specified materials.
- D. Warranty: submit a sample warranty identifying the terms and conditions stated in Section 1.7 WARRANTY.

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1.6 QUALITY ASSURANCE

- A. **Applicator Qualifications:** A firm that is approved or licensed by waterproofing manufacturer for installation of waterproofing required for this Project.
- B. **Regulatory Requirements:** Comply with applicable codes, regulations, ordinances, and laws regarding use and application of products that contain volatile organic compounds (VOC).
- C. **Preinstallation Conference:** Prior to beginning of work, conduct a conference to review waterproofing requirements including surface preparation, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details and flashings, installation procedures, testing and inspection procedures, and protection and repairs.

1.7 WARRANTY

- A. Upon completion and acceptance of the work required by this section, the manufacturer will issue a warranty agreeing to promptly replace defective materials.
- B. The formation or presence of mold or fungi on a bridge is dependent upon a broad range of factors including, but not limited to, the presence of spores and nutrient sources, moisture, temperatures, climatic conditions, and relative humidity. These factors are beyond the control of the manufacturer and they shall not be responsible for any claims, repairs, restoration, or damages relating to the presence of any irritants, contaminants, vapors, fumes, molds, fungi, bacteria, spores, mycotoxins, or similar elements on any bridge or in the air, land, or water.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver liquid materials to Project site in original containers with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, manufacturer's stock number, shelf life, directions for storing and mixing with other components, and Material Safety Data Sheet.
- B. Store liquid materials in their original undamaged containers in a clean, dry, protected location at temperatures of 40 deg F and above to facilitate handling.
- C. Recommended storage and application temperature is 75°F. Do not store at temperatures above 90 deg F (32 deg C) for extended periods.
- D. Store materials in protected, well ventilated, clean, and dry area in accordance with manufacturer's instructions.
- E. Protect materials during handling and application to prevent damage or contamination.

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1.9 PROJECT CONDITIONS

- A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate, when relative humidity exceeds 85 percent, or when temperatures are less than 5 deg F (3 deg C) above dew point.
 - 1. Do not apply waterproofing in snow, rain, fog or mist, or when such weather conditions are imminent during application and curing period.
 - 2. Do not apply membrane if temperature is less than 40 deg F.
- B. Coordinate waterproofing work with other trades to ensure adequate illumination, ventilation, and dust-free environment during application and curing of membrane. The applicator shall have sole right of access to the specified areas for the time needed to complete the application and allow the membrane to cure adequately.
- C. Protect adjoining surfaces not to be coated against damage or soiling. Protect plants, vegetation and animals, which might be affected by waterproofing operations.
- D. Warn personnel against breathing of vapors and contact of material with skin or eyes. Wear applicable protective clothing and respiratory protection gear.
- E. Keep products away from spark or flame. Do not allow the use of spark-producing equipment during application and until all vapors have dissipated. Post "NO SMOKING" signs.
- F. Maintain work area in a neat and orderly condition, removing empty containers, rags, and rubbish daily from the site.

PART 2 - PRODUCTS

2.1 SINGLE-COMPONENT or TWO-COMPONENT POLYURETHANE WATERPROOFING

- A. Single-Component, Modified Polyurethane Waterproofing: Comply with ASTM C 836 and with manufacturer's written physical requirements.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Carlisle Coatings & Waterproofing Inc.; CCW-525.
 - b. Carlisle Coatings & Waterproofing Inc.; CCW-703
 - c. Meadows, W.R., Inc.; MEL-ROL LM
 - d. Or approved equal.

2.2 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials recommended by manufacturer to be compatible with one another and with waterproofing, as demonstrated by waterproofing manufacturer, based on testing and field experience.

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- B. Primer: Manufacturer's standard, factory-formulated polyurethane or epoxy primer.
- C. Sheet Flashing: 50-mil- (1.3-mm-) minimum, nonstaining, uncured sheet neoprene.
 - 1. Adhesive: Manufacturer's recommended contact adhesive.
- D. Joint Reinforcing Strip: Manufacturer's recommended fiberglass mesh or polyester fabric.
- E. Joint Sealant: Multi-component polyurethane sealant, compatible with waterproofing, complying with ASTM C 920 Type M, Class 25; Grade NS for sloping and vertical applications or Grade P for deck applications; Use NT exposure; and as recommended by manufacturer for substrate and joint conditions.
 - 1. Backer Rod: Closed-cell polyethylene foam.
- F. Protection Course: Provide where required by the manufacturer.
- G. Molded-Sheet Drainage Panel: Comply with manufacturer's recommendations for each condition, where required.
- H. Perimeter Drainage System: Provide where required by the manufacturer.
- I. Reinforcing Fabric: Provide where required by the manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.
 - 1. Verify that concrete has cured and aged for minimum time period recommended by waterproofing manufacturer.
 - 2. Verify that substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
 - 3. Should any deficiencies exist, the bridge designer, Owner, or General Contractor shall be notified in writing and corrections made.
 - 4. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Condition of Concrete Surfaces:
 - 1. The concrete surfaces shall be of sound structural grade, minimum of 3500 PSI compressive strength, and shall have a wood float or fine broom finish, free of fins, ridges, voids or entrained air holes.
 - 2. Concrete shall be cured by water curing method. Curing compounds must be of the pure sodium silicate or removed. Refer to manufacturer's recommendations at www.carlisle-ccw.com or <http://www.wrmeadows.com> for more information.

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3. Concrete shall be cured a minimum of 14 days, 28 days preferred, and shall be sloped for proper drainage.
4. Control joints and/or expansion joints, where required, shall have been properly installed at strategic points throughout the field of the wingwalls to control cracking caused by deflection and shrinkage.
5. Any required crickets or drains should be installed at the time the wingwalls are poured. Wingwalls should be monolithic.
6. Voids, rock pockets and excessively rough surfaces shall be repaired with approved non-shrink grout or ground to match the unrepaired areas.
7. Where required two-stage drains shall have a minimum three inch flange and be installed with the flange flush and level with the concrete surface.
8. Surfaces at cold joints shall be on the same plane.

3.2 SURFACE PREPARATION

- A. Clean and prepare substrate according to manufacturer's written recommendations. Provide clean, dust-free, and dry substrate for waterproofing application.
- B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage or overspray affecting other construction.
- C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, acid residues, and other penetrating contaminants or film-forming coatings from concrete.
- D. Remove fins, ridges, and other projections and fill honeycomb, aggregate pockets, and other voids.
- E. Corner and Edge Preparation:
 1. Install a one inch face, 45° cant of manufacturer recommended polyurethane sealant at all angle changes and inside corners including projections through the wingwalls, etc.
 2. Apply a 45 mil thick stripe-coat of liquid-applied waterproofing membrane over sealant cants and extending four inches up the vertical wall to the height called out on the drawings (minimum eight inches recommended).
 3. Allow all detail work to cure overnight
- F. Crack Preparation:
 1. All cracks over 1/16" in width and all moving cracks under 1/16" in width shall be saw cut to 1/4" minimum in width and depth. Saw-cut a 1/4" by 1/4" kerf around drain flanges. Clean, prime and fill saw cuts flush with manufacturer recommended polyurethane sealant.
 2. All moving cracks over 1/16" wide and all expansion joints less than 1" wide shall be cleaned, primed, fitted with a backing rod and caulked with manufacturer's recommended polyurethane sealant. For larger joints, contact to manufacturer's representative for recommendation.
 3. Allow all sealant to cure thoroughly.

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4. Apply a 6" wide, 45-mil thick stripe-coat of liquid-applied waterproofing membrane centered over all sealed cracks, hairline cracks, joints and outside corners.
5. Allow all detail work to cure overnight.

- G. Where required, all metal and neoprene flashings shall be installed at this time. Apply a stripe coat of liquid-applied waterproofing membrane, 45 mils thick, six inches wide, centered over all transitions from concrete to metal flashings and reinforce with manufacturer's recommended reinforcing fabric. Allow the stripe coat to cure over night (16 hours minimum).

3.3 WATERPROOFING APPLICATION

- A. Primer: Application of primer shall be per membrane manufacturer's instructions. Primer is not required for adhesion to dry, non-porous concrete. However, if pinhole and blistering problems occur as a result of air and/or moisture vapors emitted from the concrete and environmental conditions, it is recommended that the surface be primed with manufacturer recommended primer. Refer to manufacturer's data sheet for full information regarding the use of this product.
- B. Wipe all detail work with a cloth wet with xylene solvent.
- C. Liquid-Applied Waterproofing Membrane: Thoroughly mechanically mix membrane prior to application. Apply in one uniform coat at the rate of one gallon minimum per 20-25 square feet per gallon as needed in order to obtain a minimum thickness of 60 wet mils. Work material into any fluted rib forming indentations.
- D. In the event the entire surface is not completed in one day, prior to beginning application the next working day clean an area 6" wide along the edge of the previously applied membrane with a cloth wet with xylene solvent. New work shall overlap the existing work by six inches.
- E. Reinforced Waterproofing Applications: Mix materials and apply waterproofing by roller, notched squeegee, trowel, or other suitable application method.
- F. Avoid use of products that contain tars, solvents, pitches, polysulfide polymers, or PVC materials that may come into contact with waterproofing membrane system.

3.4 FIELD QUALITY CONTROL

- A. Test is required for all expanded warranties beyond the standard material warranty of horizontal applications.
1. The test can be done with Electronic Vector Mapping or flood testing. Flood testing requires 2" minimum head of water for a period of 24 hours.

3.5 CURING, PROTECTION, AND CLEANING

- A. Cure waterproofing according to manufacturer's written recommendations, taking care to prevent contamination and damage during application stages and curing.

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1. Do not permit foot or vehicular traffic on unprotected membrane.

- B. Protect waterproofing membrane from damage and wear during remainder of construction period with application of protection course, drainage board or other approved material.

- C. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 071416

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SECTION 071900 - WATER REPELLENTS

PART 1 - GENERAL

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

1.2 SUMMARY

- A. This Section includes film-forming water-repellent and anti-graffiti coatings for the following vertical and horizontal surfaces:
 - 1. Concrete (unpainted).
- B. Related Sections include the following:
 - 1. Section 033000 "Cast-in-Place Concrete."
 - 2. Section 033300 "Architectural Concrete."
 - 3. Section 079200 "Joint Sealants."
 - 4. Section 099600 "High-Performance Coatings."

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For each type of water repellent and substrate indicated, 12 by 12 inches in size, with specified water-repellent treatment applied to half of each Sample.
- C. Qualification Data: For Installer, if requested.
- D. Warranty: Special warranty specified in this Section.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Submit qualifications of applicator; stating applicator has a minimum of three (3) years experience using the specified or a similar product. Provide a list of several most recently completed projects, including project name and location, names of owner and architect, and description of products used, substrates, and method of application.
 - 2. Employs persons trained for the application of the specified or similar products.
 - 3. Comply with applicable federal, state, and local environmental regulations.
- B. Pre-Application Meeting: Convene a pre-application meeting before the start of application of water repellents. Require attendance of parties directly affecting work of this section,

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including the Contractor, architect, applicator, and manufacturer's representative. Review environmental regulations, test panel procedures, protection of surrounding areas and non-masonry surfaces, surface preparation, application, field quality control, final cleaning, and coordination with other work.

- C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
 - 1. Finish areas designated by Architect.
 - 2. Apply each product application required to test panels to determine appropriate strength, coverage rates, compatibility, effectiveness, surface preparation, application procedures, and desired results.
 - 3. Apply products to test panels in accordance with manufacturer's written instructions. Allow 5 days or until test panels are thoroughly cured before evaluating final appearance and results.
 - 4. Rilem Test: Perform test to evaluate water repellent performance, using RILEM Test Method II.4.
 - 5. Graffiti Removal Test: Apply graffiti paint to test panels and allow at least 24 hours longer for paint to cure. Apply cleaner to test for ease of removal of graffiti. Repeat cycles of cleanings as directed by Architect.
 - 6. Do not begin full-scale application until test panels are inspected and approved by the Architect.
 - 7. Refinish mock-up area as required to produce acceptable work.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials to the job site in original, tightly sealed, unopened containers, with labels clearly identifying product name and manufacturer. Verify that the product matches that of the original sample applied on the test panel.
- B. Storage and Handling: Store containers upright in a cool, dry place. Keep away from sparks and open flame. Store and handle materials in accordance with manufacturer's written instructions.
- C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.6 PROJECT CONDITIONS

- A. Limitations: Proceed with application only when the following existing and forecasted weather and substrate conditions permit water repellents to be applied according to manufacturers' written instructions and warranty requirements:
 - 1. Ambient temperature is above 40 deg F.
 - 2. Concrete surfaces and mortar have cured for more than 28 days.
 - 3. Concrete or brick masonry walls are not treated prior to 30 days after building close-in.
 - 4. Rain or snow is not predicted within 24 hours.

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5. Application proceeds more than 72 hours after surfaces have been wet.
6. Substrate is not frozen, or surface temperature is above 40 deg F.
7. Windy conditions do not exist that may cause water repellent to be blown onto vegetation or surfaces not intended to be treated.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer and Applicator agree(s) to repair or replace materials that fail to maintain water repellency and graffiti removal capabilities specified in Part 1 "Performance Requirements" Article within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in other Part 2 articles.

2.2 FILM-FORMING WATER REPELLENTS

- A. Proprietary-Blend, Film-Forming Water Repellent: Clear, consisting of 1 or several different resins, acrylics, polymers, stearates, or oils plus other compounds or products of components; and with 3.3 lb/gal. or less of VOCs.

1. Available Products:

- a. Professional Products of Kansas, Inc.; Professional Water Sealant and Anti-Graffitiant (Super Strength PWS-15), (Extra Strength PWS-8).

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean substrate of substances that might interfere with penetration or performance of water repellents. Test for moisture content, according to water-repellent manufacturer's written instructions, to ensure that surface is dry enough.

1. Cast-in-Place Concrete: Remove oil, curing compounds, laitance, and other substances that could prevent adhesion or penetration of water repellents.

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- B. Test for pH level, according to water-repellent manufacturer's written instructions, to ensure chemical bond to silicate minerals.
- C. Protect adjoining work, including sealant bond surfaces, from spillage or blow-over of water repellent. Cover adjoining and nearby surfaces of aluminum and glass if there is the possibility of water repellent being deposited on surfaces. Cover live plants and grass.
- D. Coordination with Sealants: Do not apply water repellent until sealants for joints adjacent to surfaces receiving water-repellent treatment have been installed and cured.
 - 1. Water-repellent work may precede sealant application only if sealant adhesion and compatibility have been tested and verified using substrate, water repellent, and sealant materials identical to those used in the work.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLICATION

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect the substrate before application of water repellent and to instruct Applicator on the product and application method to be used.
- B. Apply graffiti resistant coating to substrate in accordance with manufacturer's written instructions, environmental regulations, and application procedures determined from the test panel results.
- C. Apply material as shipped by the manufacturer. Do not dilute.
- D. Apply to clean, dry, cured, and properly prepared surfaces. Do not apply to below-grade surfaces. Do not apply to painted surfaces.
- E. Do not apply graffiti resistant coating to horizontal surfaces, as it may cause surface to become slippery.
- F. Apply material using a high-volume, low pressure, pump-up sprayer (between 40 and 60 psi), with a fan tip and solvent resistant fittings. Roller or brush of natural bristle may be used in areas where spray application is not appropriate. Do not use Airless spray equipment.
- G. Two Coat Application for Graffiti Protection at Entire Surface:
 - 1. First Coat at Entire Surface: Apply PWS-15 Super Strength in a flood coat, from top to bottom of wall, being sure to obtain a 4 to 6 inch rundown of product from the point where the spray makes contact with the surface. Work all the way down the building covering the rundown as you go. Avoid excessive overlapping. Some substrates may require back rolling after product is applied to smooth out any rundown lines. Brush any excess product that may accumulate on ledges and other areas that may hold excess material.

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2. Second Coat at Entire Surface: Allow surface to dry to the touch before applying a second coat of PWS-8 Extra Strength (approx. 2 hours). Repeat application as described for first coat.

3.3 CLEANING

- A. Immediately clean water repellent from adjoining surfaces and surfaces soiled or damaged by water-repellent application as work progresses. Repair damage caused by water-repellent application. Comply with manufacturer's written cleaning instructions.

END OF SECTION 071900

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SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Glass-fiber blanket insulation.
 - 2. Vapor retarders.

1.3 ACTION SUBMITTALS

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

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.
- B. Research/Evaluation Reports: For foam-plastic insulation, from ICC-ES.

1.5 QUALITY ASSURANCE

- A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

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PART 2 - PRODUCTS

2.1 GLASS-FIBER BLANKET INSULATION

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. CertainTeed Corporation.
 - 2. Guardian Building Products, Inc.
 - 3. Johns Manville.
 - 4. Knauf Insulation.
 - 5. Owens Corning.
- B. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

2.2 VAPOR RETARDERS

- A. Polyethylene Vapor Retarders: ASTM D 4397, 6 mils thick, with maximum permeance rating of 0.13 perm.
- B. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean substrates of substances that are harmful to insulation or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

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3.3 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Glass-Fiber or Mineral-Wool Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
 - 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
 - 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
 - 3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
- C. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
 - 1. Glass-Fiber or Mineral-Wool Blanket Insulation: Apply according to manufacturer's written instructions.

3.4 INSTALLATION OF VAPOR RETARDERS

- A. Place vapor retarders on side of construction indicated on Drawings. Extend vapor retarders to extremities of areas to protect from vapor transmission. Secure vapor retarders in place with adhesives or other anchorage system as indicated. Extend vapor retarders to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.
- B. Seal vertical joints in vapor retarders over framing by lapping no fewer than two studs.
 - 1. Fasten vapor retarders to wood framing at top, end, and bottom edges; at perimeter of wall openings; and at lap joints. Space fasteners 16 inches o.c.
- C. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarders.
- D. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarders.

3.5 PROTECTION

- A. Protect installed insulation and vapor retarders from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

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END OF SECTION 072100

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SECTION 076100 - SHEET METAL ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes custom-fabricated, standing-seam sheet metal roofing.
- B. Related Requirements:
 - 1. Section 076200 "Sheet Metal Flashing and Trim" fasciae, copings, and flashings that are not part of sheet metal roofing.

1.3 COORDINATION

- A. Coordinate sheet metal roofing layout and seams with sizes and locations of roof penetrations.
- B. Coordinate sheet metal roofing installation with rain drainage work, flashing, trim, and construction of roofing substrate, parapets, walls, and other adjoining work to provide leakproof, secure, and noncorrosive installation.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.
- B. Shop Drawings: For sheet metal roofing.
 - 1. Include plans, elevations, sections, and attachment details.
 - 2. Detail fabrication and installation layouts, expansion joint locations, fixed points, and keyed details. Distinguish between shop- and field-assembled work.
 - 3. Include details for forming, including seams and dimensions.
 - 4. Include details for joining and securing, including layout and spacing of fasteners, cleats, and other attachments. Include pattern of seams.
 - 5. Include details of termination points and assemblies.
 - 6. Include details of expansion joints, including showing direction of expansion and contraction from fixed points.
 - 7. Include details of roof penetrations.

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8. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings.
9. Include details of special conditions.
10. Include details of connections to adjoining work.
11. Detail the following accessory items:

- a. Flashing and trim.

C. Samples for Verification: For each type of exposed finish.

1. Sheet Metal Roofing: 12 inches long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, and other attachments.
2. Trim and Metal Closures: 12 inches long and in required profile. Include fasteners and other exposed accessories.
3. Other Accessories: 12-inch- long Samples for each type of other accessory.

1.5 INFORMATIONAL SUBMITTALS

- A. Roll-Forming & Brake-forming Equipment: Sheet metal roofing contractor, specialty sheet metal fabricator, or manufacturer to issued letter stating that tooling provides the necessary radius bends required for proper fabrication of specified sheet metal roofing, flashing & trim..
- B. Qualification Data: Provide references from installer with minimum five years experience in successfully completed sheet metal roofing installation substantiating abilities to successfully complete the work. Also provide similar qualifications of sheet metal material manufacturer and fabricators. In addition, qualified Installer shall provide evidence of financial responsibility from bank and creditors.
- C. Engineering Calculations: Provide back-up documentation certified by a licensed (KY registered) Structural Engineer demonstrating that the roof panel will resist wind uplift meeting local building code requirements & test criteria found in UL90. Calculations shall verify proposed attachment (clips, screws, spacing, etc.) meet the design & performance intent.
- D. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- E. Sample Warranties: For special warranties.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For roofing sheet metals and accessories to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. General: Engage an experienced metal roofing contractor with a minimum of five years experience with fabrication and installation of standing seam sheet metal roofing.

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- B. Sheet Metal Roofing Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or indicated on Drawings. Mockups: Contractor to frame mockup at the jobsite to be clad by the sheet metal roofing contractor. Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation. As approved by the architect, a section of the building may be used to verify quality expectation for the rest of the work.
- C. Preinstallation Conference: Conduct conference at Project site.
 - 1. Meet with Owner, Architect, sheet metal roofing Manufacturer and Installer, portable roll-forming equipment manufacturer's representative for sheet metal roofing, and sheathing Installer, and installers whose work interfaces with or affects sheet metal roofing including installers of roof accessories and roof-mounted equipment.
- D. Sheet Metal Roofing Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal roofing similar to that required for this Project and whose products have a record of successful in-service performance.
- E. Mockups: Build mockups to verify selections made under Sample submittals to demonstrate aesthetic effects and to set quality standards for fabrication and installation.
 - 1. Build mockup of typical roof area and eave as shown on Drawings, including, underlayment, attachments, and accessories.
 - a. Size: Approximately 24 inches by 42 inches.
 - b. Include each type of exposed seam and seam termination, fascia, soffit, and gable end and rake.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Do not store sheet metal roofing materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal roofing materials away from uncured concrete and masonry.
- B. Protect strippable protective covering on sheet metal roofing from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal roofing installation.

1.9 WARRANTY

- A. Special Warranty: Warranty form at end of this Section in which Installer agrees to repair or replace components of sheet metal roofing that fail in materials or workmanship within specified warranty period.

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1. Failures include, but are not limited to, the following:
 - a. Structural failures including, but not limited to, rupturing, cracking, or puncturing.
 - b. Wrinkling or buckling.
 - c. Loose parts.
 - d. Failure to remain weathertight, including uncontrolled water leakage.
 - e. Deterioration of metals, metal finishes, and other materials beyond normal weathering, including non-uniformity of color or finish.
 - f. Galvanic action between sheet metal roofing and dissimilar materials.
 2. Warranty Period:
 - a. Two years from date of Substantial Completion.
 - b. Twenty years for sheet metal roofing manufacturer.
 - c. Twenty years material warranty.
- B. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal roofing that shows evidence of deterioration of factory-applied finishes within specified warranty period.
1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Sheet metal roofing system including, but not limited to, metal roof panels, cleats, anchors and fasteners, sheet metal flashing integral with sheet metal roofing, fascia panels, trim, underlayment, and accessories, shall comply with requirements without failure due to defective manufacture, fabrication, or installation, or due to other defects in construction. Sheet metal roofing shall remain watertight.
- B. Sheet Metal Roofing Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or indicated on Drawings.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects.
 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

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2.2 ROOFING SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
- A. Metallic-Coated Steel Sheet: Provide: Aluminum-zinc alloy-coated steel sheet according to ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40; with smooth surface; prepainted by coil-coating process to comply with ASTM A 755/A 755M.
 - 1. Manufacturers: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Dimensional Metals, Inc.; DOUBLE-LOCK DL-15.
 - b. Fabral Metal Wall and Roof Systems; Thin Seam Architectural Roofing.
 - c. Petersen Aluminum Corporation; Redi-Roof.
 - 2. Roof Panel Thickness: 24 ga.
 - 3. Fascia Panel Thickness: 1.0mm (no backside coating required).
 - 4. Width: Nominal 16 inch panel width without striations or intermediate ribs.
 - 5. Vertical Seam: 1-1/2 inch high; double-lock (DLSSS).
 - 6. Finish: Kynar 500: Metallics Colors: Weathered Zinc.

2.3 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Sheet: Minimum 30 mils thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer according to written recommendations of underlayment manufacturer.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Carlisle Residential, a division of Carlisle Construction Materials; WIP 300HT.
 - b. Grace Construction Products, a unit of W. R. Grace & Co.-Conn.; Grace Ice and Water Shield HT or Ultra.
 - c. Owens Corning; WeatherLock Specialty Tile & Metal Underlayment.
 - 2. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F or higher.
 - 3. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F or lower.
- B. Nailbase & Rigid Insulation: Provide polyisocyanurate foam (20 psi min.) insulation board with integral nailing surface of 5/8" plywood by Hunter Panels or equal (without venting cavity). Additional layers of insulation shall be multiple layers by same polyisocyanurate manufacture.

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2.4 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete roofing system and as recommended by primary sheet metal manufacturer unless otherwise indicated.
- B. Fasteners: Wood screws, annular-threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads.
 - 1. General:
 - a. Exposed Fasteners: Heads matching color of sheet metal roofing using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of roofing.
 - b. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws, gasketed; with hex-washer head.
 - c. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
 - 1. Fasteners: Series 300 stainless steel or hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.
- C. Solder: ASTM B 32, 50 percent tin and 50 percent lead, with maximum lead content of 0.2 percent.
- D. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
- E. Elastomeric Sealant: ASTM C 920, elastomeric polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal roofing and remain watertight.
- F. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

2.5 ACCESSORIES

- A. Sheet Metal Accessories: Provide components required for complete sheet metal roofing assembly including trim, copings, fascia, corner units, clips, flashings, sealants, gaskets, fillers, metal closures, closure strips, and similar items. Match material and finish of sheet metal roofing unless otherwise indicated.
 - 1. Provide accessories as recommended by portable roll-forming equipment manufacturer to produce sheet metal roofing assemblies that comply with Engineering Calculations and wind-uplift resistance classification specified in "Quality Assurance" Article.

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2. Cleats: Intermittent and continuous attachment devices for mechanically seaming into joints and formed from the following materials and thicknesses unless otherwise indicated:
 - a. Sheet Metal Roofing: Manufacturer's preformed stainless-steel cleats.
 3. Expansion-Type Cleats: Cleats of a design that allows longitudinal movement of roof panels without stressing panel seams; of same material as other cleats.
 4. Backing Plates: Plates at roofing splices, fabricated from material recommended by SMACNA.
 5. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin foam or closed-cell laminated polyethylene; minimum 1-inch- thick, flexible-closure strips; cut or premolded to match sheet metal roofing profile. Provide closure strips where necessary to ensure weathertight construction.
 6. Flashing and Trim: Formed from same material and with same finish as sheet metal roofing, minimum 0.7mm thick (0.018 inch for stainless steel).
- B. Pipe Flashing: Shop or field-fabricated, soldered metal pipe collar from same material as roofing sheet.

2.6 FABRICATION

- A. General: Custom fabricate sheet metal roofing to comply with details shown and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions (panel width and seam height), geometry, metal thickness, and other characteristics of installation. Fabricate sheet metal roofing and accessories in shop to greatest extent possible.
1. Standing-Seam Roofing: Form standing-seam panels with finished seam height of 1-1/2 inches.
- B. Fabrication Tolerances: Fabricate sheet metal roofing that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
- C. Form exposed sheet metal work to fit substrates with little oil canning; free of buckling and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
1. Lay out sheet metal roofing so transverse seams, if required, are made in direction of flow with higher panels overlapping lower panels.
 2. Offset transverse seams from each other per drawings.
 3. Fold and cleat eaves and transverse seams in shop.
 4. Form and fabricate sheets, seams, strips, cleats, valleys, ridges, edge treatments, integral flashings, and other components of metal roofing to profiles, patterns, and drainage arrangements indicated on Drawings and as required for leakproof construction.

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- D. Expansion Provisions: Fabricate sheet metal roofing to allow for expansion in running work sufficient to prevent leakage, damage, and deterioration of the Work.
 - 1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
 - 2. Use lapped expansion joints only where indicated on Drawings.
 - 3. Provide adequate room for movement at details based on temperature at time of installation. Provide 3 fixed clips for pinned installation location. Balance of concealed seam clips shall be 2-piece expanding clips.
- E. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to SMACNA standards.
- F. Sheet Metal Accessories: Custom fabricate flashings and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item required. Obtain field measurements for accurate fit before shop fabrication.
 - 1. Form exposed sheet metal accessories without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
 - 2. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use.
 - 3. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate elastomeric sealant.
 - 4. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces of accessories exposed to view.
 - 5. Fabricate cleats and attachment devices of sizes recommended by SMACNA's "Architectural Sheet Metal Manual" for application, but not less than thickness of metal being secured.
- G. Do not use graphite pencils to mark metal surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.
 - 1. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking, that tops of fasteners are flush with surface, and that installation is within flatness tolerances required for finished roofing installation.

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2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored, and that provision has been made for drainage, flashings, and penetrations through sheet metal roofing.
 3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Examine roughing-in for components and systems penetrating sheet metal roofing to verify actual locations of penetrations relative to seam locations of sheet metal roofing before installation.
- C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Lay out panel arrangement before installation of sheet metal roofing.
1. Space fasteners not more than 18 inches o.c.

3.3 UNDERLAYMENT INSTALLATION

- A. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Prime substrate if recommended by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps and edges with roller. Cover underlayment within 14 days.
1. Apply self-adhering sheet underlayment over entire metal roof area.
- B. Install flashings to cover underlayment according to requirements in Section 076200 "Sheet Metal Flashing and Trim."

3.4 INSTALLATION, GENERAL

- A. General: Install sheet metal roofing to comply with details shown and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to installation characteristics required unless otherwise indicated on Drawings. Install fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required for complete roofing system and as recommended by fabricator for sheet metal roofing.
1. Install sheet metal roofing true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
 2. Anchor sheet metal roofing and other components of the Work securely in place, with provisions for thermal and structural movement.

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3. Field cutting of sheet metal roofing by torch is not permitted.
 4. Provide metal closures at peaks, rake edges, eaves, and each side of ridge caps.
 5. Flash and seal sheet metal roofing with closure strips at eaves, rakes, and perimeter of all openings. Fasten with self-tapping screws.
 6. Locate and space fastenings in uniform vertical and horizontal alignment. Predrill panels for fasteners.
 7. Install ridge caps as sheet metal roofing work proceeds.
 8. Locate roofing splices over, but not attached to, structural supports. Stagger roofing splices and end laps to avoid four-panel lap splice condition. Install backing plates at roofing splices.
 9. Lap metal flashing over sheet metal roofing to direct moisture to run over and off roofing.
 10. Do not use graphite pencils to mark metal surfaces.
- B. Thermal Movement: Rigidly fasten metal roof panels to structure at only one location for each panel. Allow remainder of panel to move freely for thermal expansion and contraction.
1. Point of Fixity: Fasten each panel along single line of fixing located at ridge.
 2. Avoid attaching accessories through roof panels in manner that inhibits thermal movement.
- C. Fasteners: Use fastener sizes that penetrate wood sheathing not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.
- D. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating, by applying self-adhering sheet underlayment to each contact surface, or by other permanent separation as recommended by sheet metal manufacturer or SMACNA.
- E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- F. Fasciae: Align bottom of sheet metal roofing and fasten with blind rivets, bolts, or self-tapping screws. Flash and seal sheet metal roofing with closure strips where fasciae meet soffits, along lower panel edges, and at perimeter of all openings.
- ### 3.5 CUSTOM-FABRICATED SHEET METAL ROOFING INSTALLATION
- A. Fabricate and 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 metal temper and reflectivity. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant. Fold back sheet metal to form hem on concealed side of exposed edges unless otherwise indicated.
1. Install cleats to hold sheet metal panels in position. Attach each cleat with at least two fasteners to prevent rotation.

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2. Space cleats not more than 12 inches o.c. Bend tabs over fastener head.
 3. Provide expansion-type cleats for roof panels that exceed 30 feet in length.
- B. Seal joints as required for watertight construction. For roofing with 3:12 slopes or less, use cleats at transverse seams.
1. Use sealant-filled joints unless otherwise indicated. Embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is between 48 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 48 deg F.
 2. Provide dry-joints at eave termination to allow any water infiltration to weep out (no sealant at eave).
 3. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."
- C. Standing-Seam Roofing: Attach standing-seam metal panels to substrate with double-fastened cleats spaced at 12 inches o.c. Install panels reaching from eave to ridge before moving to adjacent panels. Before panels are interlocked, apply continuous bead of sealant to top of flange of lower panel. Lock standing seams by folding over twice so cleat and panel edges are completely engaged.
1. Lock each panel to panel below with sealed transverse seam.
 2. Loose-lock panels at eave edges to continuous cleats and flanges at roof edge at gutters.

3.6 ACCESSORY INSTALLATION

- A. General: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for complete sheet metal roofing assembly including trim, copings, seam covers, flashings, sealants, gaskets, fillers, metal closures, closure strips, and similar items.
 2. Install accessories integral to sheet metal roofing that are specified in Section 076200 "Sheet Metal Flashing and Trim" to comply with that Section's requirements.
- B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and install units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.
1. Install flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers.

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2. Install continuous strip of self-adhering underlayment at edge of continuous flashing overlapping self-adhering underlayment, where "continuous seal strip" is indicated in SMACNA's "Architectural Sheet Metal Manual" and on Drawings.
3. Install exposed flashing and trim without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates, and to result in waterproof and weather-resistant performance.
4. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.
 - a. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, and filled with butyl sealant concealed within joints.

- C. Pipe Flashing: Form flashing around pipe penetration and sheet metal roofing. Fasten and seal to sheet metal roofing as recommended by SMACNA.

3.7 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal roofing within installed tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.8 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials immediately with damp cloth. Clean off excess solder.
- C. Clean off excess sealants..
- D. Remove temporary protective coverings and strippable films as sheet metal roofing is installed unless otherwise indicated in manufacturer's written installation instructions. On completion of sheet metal roofing installation, clean finished surfaces as recommended by sheet metal roofing manufacturer. Maintain sheet metal roofing in clean condition during construction.
- E. Replace sheet metal roofing components that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

3.9 ROOFING INSTALLER'S WARRANTY

- A. WHEREAS **<Insert name>** of **<Insert address>**, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:
 1. Owner: **<Insert name>**.
 2. Owner's Address: **<Insert address>**.

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3. Building Name/Type: <Insert information>.
 4. Building's Address: <Insert address>.
 5. Area of Work: <Insert information>.
 6. Acceptance Date: <Insert date>.
 7. Warranty Period: <Insert time>.
 8. Expiration Date: <Insert date>.
- B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,
- C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.
- D. This Warranty is made subject to the following terms and conditions:
1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:
 - a. Lightning;
 - b. Peak gust wind speed exceeding 90 MPH;
 - c. Fire;
 - d. Failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
 - e. Faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
 - f. Vapor condensation on bottom of roofing; and
 - g. Activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.
 2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
 3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.
 4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or

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deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.

5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.
6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this **<Insert day>** day of **<Insert month>**, **<Insert year>**.

1. Authorized Signature: **<Insert signature>**.
2. Name: **<Insert name>**.
3. Title: **<Insert title>**.

END OF SECTION 076100

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SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Formed Products: Formed roof and wall sheet metal fabrications.

- B. Related Sections:

- 1. Division 06 Section "Exterior Rough Carpentry" for wood nailers, curbs, and blocking.
 - 2. Division 07 Section "Sheet Metal Roofing" for custom-formed sheet metal flashing and trim integral with sheet metal roofing.

1.3 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies as indicated shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, shall remain watertight, and shall be installed to shed water.

- B. Thermal Movements: Provide sheet metal flashing and trim that allows for thermal movements from ambient and surface temperature changes.

- 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.

- B. Shop Drawings: Show fabrication and installation layouts of sheet metal flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work. Include the following:

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1. Identification of material, thickness, weight, and finish for each item and location in Project.
 2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
 3. Details for joining, supporting, and securing sheet metal flashing and trim, including layout of fasteners, cleats, clips, and other attachments. Include pattern of seams.
 4. Details of termination points and assemblies, including fixed points.
 5. Details of special conditions.
 6. Details of connections to adjoining work.
- C. Samples for Initial Selection: For each type of sheet metal flashing, trim, and accessory indicated with factory-applied color finishes involving color selection.
- D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
1. Sheet Metal Flashing: 12 inches long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
- 1.5 INFORMATIONAL SUBMITTALS
- A. Qualification Data: For qualified fabricator.
- 1.6 QUALITY ASSURANCE
- A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.
- B. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" or follow the more stringent requirements for conflicting instructions specified or shown on Drawings.
- C. Preinstallation Conference: Conduct conference at Project site.
- 1.7 DELIVERY, STORAGE, AND HANDLING
- A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
- B. Protect finished surfaces with strippable protective film covering on all sheet metal flashing and trim. During fabrication, transport, and storage phases, film may be removed immediately prior to final installation.

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PART 2 - PRODUCTS

2.1 SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.
- A. Metallic-Coated Steel Sheet: Provide: Aluminum-zinc alloy-coated steel sheet according to ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40; with smooth surface; prepainted by coil-coating process to comply with ASTM A 755/A 755M.
 - 1. Manufacturers: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Dimensional Metals, Inc.; DOUBLE-LOCK DL-15.
 - b. Fabral Metal Wall and Roof Systems; Thin Seam Architectural Roofing.
 - c. Petersen Aluminum Corporation; Redi-Roof.
 - 2. Finish: Kynar 500: Metallics Colors: Weathered Zinc.

2.2 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied as recommended by sheet metal manufacturer. Provide primer when recommended by underlayment manufacturer.
 - 1. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F.
 - 2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F.
 - 3. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Carlisle Coatings & Waterproofing Inc.; CCW WIP 300HT.
 - b. Grace Construction Products, a unit of W. R. Grace & Co.; Ultra or Ice and Water HT.
 - c. Henry Company; Blueskin PE200 HT.
 - d. Metal-Fab Manufacturing, LLC; MetShield.
 - e. Owens Corning; WeatherLock Metal High Temperature Underlayment.
 - f. IMETCO; Aqua-block-60.

2.3 MISCELLANEOUS MATERIALS

- 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 and recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.

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1. Coordinate with Sheet Metal Roofing flashings to provide complete, watertight installation.
 - B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - a. Concealed Fasteners: Stainless steel self-tapping screws.
 - b. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating.
 - c. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
 2. Fasteners for Aluminum-Zinc Alloy-Coated Steel Sheet: Series 300 stainless steel or hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.
 3. Solder: ASTM B 32, 50 percent tin and 50 percent lead, with maximum lead content of 0.2 percent.
 - C. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
 - D. Elastomeric Sealant: ASTM C 920, elastomeric polymer sealant; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
 - E. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
 - F. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
 - G. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.
- 2.4 STEEP-SLOPE ROOF SHEET METAL FABRICATIONS
- A. Drip Edges: Fabricate from the following materials:
 1. Aluminum-Zinc Alloy-Coated Steel: 0.022 (0.56 mm) thick.
 - B. Eave, Rake Flashing and Fascia Panels: Fabricate from the following materials:
 1. Aluminum-Zinc Alloy-Coated Steel: 0.022 (0.56 mm) thick.
 - C. Roof-Penetration Flashing: Fabricate from the following materials:

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1. Aluminum-Zinc Alloy-Coated Steel: 0.028 (0.71 mm) thick.

2.5 WALL SHEET METAL FABRICATIONS

- A. Opening Flashings in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings. Form head and sill flashing with 2-inch- high, end dams. Fabricate from the following materials:

1. Aluminum-Zinc Alloy-Coated Steel: 0.022 (0.56 mm) thick.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of the Work.
 1. Verify compliance with requirements for installation tolerances of substrates.
 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
- B. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 UNDERLAYMENT INSTALLATION

- A. General: Install underlayments as recommended by sheet metal manufacturer and as indicated on Drawings.
- B. Felt Underlayment: Install felt underlayment with adhesive for temporary anchorage to minimize use of mechanical fasteners under sheet metal flashing and trim. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches.
- C. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Apply primer if required by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer rather than nails for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps with roller. Cover underlayment within 14 days.

3.3 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding

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rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

1. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
 2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 3. Space cleats not more than 12 inches apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
 4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
 5. Install sealant tape where indicated.
 6. Torch cutting of sheet metal flashing and trim is not permitted.
 7. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.
1. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment as recommended by manufacturer.
 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
- C. Fastener Sizes: Use fasteners of sizes that will penetrate wood sheathing not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.
- D. Seal joints as shown and as required for watertight construction.
1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.
 2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."
- E. Soldered Joints: 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, except reduce pre-tinning where pre-tinned surface would show in completed Work.

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3.4 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
- B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in SMACNA's "Architectural Sheet Metal Manual" and as indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 3-inch centers.
- C. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal and solder flashing to pipes that penetrate roof.

3.5 WALL FLASHING INSTALLATION

- A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
- B. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings.

3.6 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.7 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder. Clean off excess sealants.
- C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of installation, remove unused materials and clean finished surfaces. Maintain in a clean condition during construction.
- D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 076200

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SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Silicone joint sealants.
 - 2. Urethane joint sealants.
 - 3. Latex joint sealants.
- B. Related Sections:
 - 1. Section 088000 "Glazing" for glazing sealants.

1.3 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- D. Joint-Sealant Schedule: Include the following information:
 - 1. Joint-sealant application, joint location, and designation.
 - 2. Joint-sealant manufacturer and product name.
 - 3. Joint-sealant formulation.
 - 4. Joint-sealant color.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.

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- C. Warranties: Sample of special warranties.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.
- C. Mockups: Install sealants in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section. Obtain Architect's approval of mockups.
- D. Preinstallation Conference: Conduct conference at Project site.

1.6 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
 - 2. When joint substrates are wet.
 - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 - 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.7 WARRANTY

- A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

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- B. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
- C. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- D. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

- A. Mildew-Resistant, Single-Component, Acid-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Dow Corning Corporation; 786 Mildew Resistant.
 - b. GE Advanced Materials - Silicones; Sanitary SCS1700.
 - c. Tremco Incorporated; Tremsil 200 Sanitary.

2.3 URETHANE JOINT SEALANTS

- A. Multicomponent, Nonsag, Urethane Joint Sealant: ASTM C 920, Type M, Grade NS, Class 25, for Use NT.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Pecora Corporation; Dynatred.
 - b. Sika Corporation, Construction Products Division; Sikaflex - 2c NS.
 - c. Tremco Incorporated; Vulkem 227.
- B. Immersible, Multicomponent, Nonsag, Traffic-Grade, Urethane Joint Sealant: ASTM C 920, Type M, Grade NS, Class 25, for Use T and I.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Pecora Corporation; Dynatred.
 - b. BASF Building Systems; Sonolastic NP2.
 - c. Tremco Incorporated; Vulkem 227.

2.4 LATEX JOINT SEALANTS

- A. Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

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1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. BASF Building Systems; Sonolac.
 - b. Pecora Corporation; AC-20+.
 - c. Tremco Incorporated; Tremflex 834.

2.5 JOINT SEALANT BACKING

- A. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.6 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

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3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Stone.
 3. Remove laitance and form-release agents from concrete.
 4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
 - b. Glass.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

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1. Do not leave gaps between ends of sealant backings.
 2. Do not stretch, twist, puncture, or tear sealant backings.
 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
1. Place sealants so they directly contact and fully wet joint substrates.
 2. Completely fill recesses in each joint configuration.
 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, straight, level, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
1. Completely remove all excess sealant from surfaces adjacent to joints.
 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.
 - a. Use masking tape to protect surfaces adjacent to recessed tooled joints.
- G. For pavement joints and joints in masonry or stone, evenly apply fine sand mix into wet joints and allow to cure. Carefully remove excess sand.
1. Architect will select sand color from mockups.

3.4 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work and as directed by Architect.

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3.6 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces.
 - 1. Joint Locations:
 - a. Isolation and contraction joints in cast-in-place concrete slabs.
 - b. Other joints as indicated.
 - 2. Urethane Joint Sealant: Immersible, multicomponent, nonsag, traffic grade, Class 25.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- B. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.
 - 1. Joint Locations:
 - a. Construction joints in cast-in-place concrete.
 - b. Control and expansion joints in unit masonry and stone.
 - c. Joints between different materials listed above.
 - d. Perimeter joints between materials listed above and frames of doors, windows, and louvers.
 - e. Control and expansion joints in ceilings and other overhead surfaces.
 - f. Other joints as indicated.
 - 2. Urethane Joint Sealant: Multicomponent, nonsag, Class 25.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- C. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces.
 - 1. Joint Locations:
 - a. Control and expansion joints on exposed interior surfaces of exterior walls.
 - b. Perimeter joints of exterior openings where indicated.
 - c. Vertical joints on exposed surfaces of paneling, walls, and partitions.
 - d. Perimeter joints between interior wall surfaces and frames of interior doors, windows, and elevator entrances.
 - e. Other joints as indicated.
 - 2. Joint Sealant: Latex, Acrylic based.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- D. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.
 - 1. Joint Sealant Location:
 - a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - b. Tile control and expansion joints where indicated.

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- c. Other joints as indicated.
2. Joint Sealant: Single component, nonsag, mildew resistant, acid curing.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION 079200

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SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes standard hollow metal galvanized exterior doors and frames.
- B. Related Sections:
 - 1. Division 08 Section "Door Hardware" for door hardware for hollow metal doors.
 - 2. Division 09 Section "High-Performance Coatings" for field painting hollow metal doors and frames.

1.3 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings.
- B. Standard Hollow Metal Work: Hollow metal work fabricated according to ANSI/SDI A250.8.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, and finishes.
- B. Shop Drawings: Include the following:
 - 1. Elevations of each door design.
 - 2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
 - 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 - 4. Locations of reinforcement and preparations for hardware.
 - 5. Details of each different wall opening condition.
 - 6. Details of accessories.
- C. Other Action Submittals:
 - 1. Schedule: Provide a schedule of hollow metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with door hardware schedule.

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- D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type of hollow metal door and frame assembly.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain hollow metal work from single source from single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
 - 1. Provide additional protection to prevent damage to finish of factory-finished units.
- B. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch- high wood blocking. Do not store in a manner that traps excess humidity.
 - 1. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

1.7 PROJECT CONDITIONS

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

1.8 COORDINATION

- A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Amweld Building Products, LLC.
 - 2. Ceco Door Products; an Assa Abloy Group company.
 - 3. Deansteel Manufacturing Company, Inc.
 - 4. Steelcraft; an Ingersoll-Rand company.

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2.2 MATERIALS

- A. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum A40 metallic coating.
- B. Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), 40Z coating designation; mill phosphatized.
 - 1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.
- C. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.
- D. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow metal frames of type indicated.
- E. Grout: ASTM C 476, except with a maximum slump of 4 inches as measured according to ASTM C 143/C 143M.
- F. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool with 6- to 12-lb/cu. ft. density; with maximum flame-spread and smoke-development indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.
- G. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.3 STANDARD HOLLOW METAL DOORS

- A. General: Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8.
 - 1. Design: Flush panel.
 - 2. Core Construction: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core.
 - a. Thermal-Rated (Insulated) Doors: Where indicated, provide doors fabricated with thermal-resistance value (R-value) of not less than 6.0 deg F x h x sq. ft./Btu when tested according to ASTM C 1363.
 - 1) Locations: Exterior doors.

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3. Vertical Edges for Single-Acting Doors: Beveled edge.
 - a. Beveled Edge: 1/8 inch in 2 inches.
 4. Top and Bottom Edges: Closed with flush or inverted 0.042-inch- thick, end closures or channels of same material as face sheets.
 5. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."
- B. Exterior Doors: Face sheets fabricated from metallic-coated steel sheet. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
1. Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 2 (Seamless).
- 2.4 STANDARD HOLLOW METAL FRAMES
- A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.
 - B. Exterior Frames: Fabricated from metallic-coated steel sheet.
 1. Fabricate frames with mitered or coped corners.
 2. Fabricate frames as face welded.
 3. Frames for Level 3 Steel Doors: 0.053-inch- thick steel sheet.
- 2.5 FRAME ANCHORS
- A. Jamb Anchors:
 1. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch-diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.
- 2.6 FABRICATION
- A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
 - B. Tolerances: Fabricate hollow metal work to tolerances indicated in SDI 117.
 - C. Hollow Metal Doors:
 1. Exterior Doors: Provide weep-hole openings in bottom of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.

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- D. Hollow Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
 - 1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
 - 2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 - 3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
 - 4. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
 - 5. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.
 - 6. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Keep holes clear during construction.
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
- E. Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold- or hot-rolled steel sheet.
- F. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."
 - 1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
 - 2. Reinforce doors and frames to receive nontemplated, mortised and surface-mounted door hardware.
 - 3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.

2.7 STEEL FINISHES

- A. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.
 - 1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.
 - 2. Reference Division 09 Section for field-painting requirements.

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PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
- C. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prior to installation, review and adjust wood frames for squareness, alignment, twist, and plumbness.
- B. Drill and tap doors to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

- A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.
- B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11.
 - 1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - a. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
 - b. Install door silencers in frames before grouting.
 - c. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - d. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 - e. Field-apply bituminous coating to backs of frames that are filled with grout containing antifreezing agents.

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2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
 - a. Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
 3. Concrete Walls: Solidly fill space between frames and concrete with grout. Take precautions, including bracing frames, to ensure that frames are not deformed or damaged by grout forces.
 4. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 5. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch measured at jambs at floor.
- C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
1. Non-Fire-Rated Standard Steel Doors:
 - a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
 - b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
 - c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
 - d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.

3.4 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, damaged or otherwise unacceptable to architect.
- B. Remove grout and other bonding material from hollow metal work immediately after installation.
- C. Metallic-Coated Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION 081113

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SECTION 085201 - CUSTOM-BUILT WOOD WINDOWS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes custom built wood windows.
- B. Related Sections:
 - 1. Section 062063 "Exterior Finish Carpentry" for wood, including window frames and wood siding.
 - 2. Section 099300 "Staining and Transparent Finishing" for staining of wood frames.

1.3 PERFORMANCE REQUIREMENTS

- A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Design glass, including comprehensive engineering analysis according to the Kentucky Building Code using the following design criteria:
 - 1. Design Wind Pressures: Determine design wind pressures applicable to Project according to ASCE/SEI 7, based on heights above grade indicated on Drawings.
 - a. Basic Wind Speed: 90 mph
 - b. Importance Factor: 1.15
 - c. Exposure Category: C
 - 2. Vertical Glazing: For glass surfaces sloped 15 degrees or less from vertical, design glass to resist design wind pressure based on glass type factors for short-duration load.
 - 3. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch, whichever is less.
 - 4. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.

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- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 2. Review, discuss, and coordinate the interrelationship of wood windows with other exterior wall components. Include provisions for anchoring, flashing, weeping, sealing perimeters, and protecting finishes.
 - 3. Review and discuss the sequence of work required to construct a watertight and weathertight exterior building envelope.
 - 4. Inspect and discuss the condition of substrate and other preparatory work performed by other trades.

1.5 ACTION SUBMITTALS

- A. Product Data: For glazing products.
- B. Shop Drawings: Include plans, elevations, sections, and details of installation, including anchor, flashing, and sealant installation.
- C. Glass Samples: 12 inches square.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For glazing manufacturer and Installer.
- B. Product Test Reports: For glazing, tests performed by a qualified testing agency.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An installer acceptable for installation of units required for this Project.
- B. Source Limitations for Glass: Obtain glass from single source from single manufacturer.
- C. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction or the manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

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1.8 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace wood windows that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Failure to meet performance requirements.
 - b. Structural failures including excessive deflection, water leakage, and air infiltration.
 - c. Deterioration of materials and finishes beyond normal weathering.
 - 2. Warranty Period:
 - a. Window: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 WOOD WINDOW FRAMES

- A. Milled Shapes for Semi-Transparent Stained Finish: WMMPA WM4 N Grade wood moldings, without finger jointing. Made from kiln-dried stock to patterns indicated:
 - 1. Species: Western Red Cedar.
 - 2. Refer to drawings for window frame profiles.

2.2 GLASS PRODUCTS, GENERAL

- A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.
 - 1. Minimum Glass Thickness for Exterior Lites: Not less than 6.0 mm.
 - 2. Thickness of Tinted Glass: Provide same thickness for each tint color indicated throughout Project.
- B. Strength: Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.
- C. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
 - 1. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F.
 - 2. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.

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2.3 GLASS PRODUCTS

- A. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear), fully tempered.
 - 1. Thickness: 6.0 mm
 - 2. U-Factor: 1.03 maximum.
 - 3. Solar Heat Gain Coefficient: .82 maximum.
 - 4. Provide safety glazing labeling.

2.4 FABRICATION

- A. Fabricate wood windows in sizes indicated. Include a complete system for installing and anchoring windows. Provide weathertight construction.
- B. Glaze wood windows in the shop.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Verify rough opening dimensions, levelness of sill plate, and operational clearances.
- C. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure weathertight window installation.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install windows level, plumb, square, true to line, without distortion, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction to produce weathertight construction.

3.3 FIELD QUALITY CONTROL

- A. Testing and inspecting of installed windows shall take place as follows:
 - 1. Air-Infiltration Testing:
 - a. Test Pressure: That required to determine compliance with AAMA/WDMA/CSA 101/I.S.2/A440 performance class indicated.
 - 2. Water-Resistance Testing:

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- a. Allowable Water Infiltration: No water penetration.
 - B. Remove and replace noncomplying windows and retest as specified above.
 - C. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
 - D. Prepare test and inspection reports.
- 3.4 ADJUSTING, CLEANING, AND PROTECTION
- A. Adjust for a tight fit and weathertight closure.
 - B. Clean exposed surfaces immediately after installing windows. Remove excess sealants, glazing materials, dirt, and other substances.
 - 1. Keep protective films and coverings in place until final cleaning.
 - C. Remove and replace windows if glass has been broken, chipped, cracked, abraded, or damaged during construction period.
 - D. Protect window surfaces from contact with contaminating substances resulting from construction operations. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written instructions.

END OF SECTION 085201

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SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes commercial door hardware for swinging doors.
- B. Related Sections include Division 08 Section "Hollow Metal Doors and Frames."

1.3 REFERENCES

- A. Use the following references to properly detail, schedule, furnish, and install finish hardware items.
 - 1. NFPA 80 – Standard for Fire Doors and Other Opening Protectives (2007).
 - 2. ANSI/Door and Hardware Institute – ANSI/DHI A115.IG – Installation Guide for Doors and Hardware (1994).
 - 3. Door and Hardware Institute – DHI – Sequence and Format for the Hardware Schedule (1996).
 - 4. DHI – Keying Systems and Nomenclature (1999).
 - 5. ANSI/BHMA A156.13 – Mortise Locks and Latch Series 1000 (2005).
 - 6. ANSI/BHMA A156.18 – Materials and Finishes (2006).
 - 7. ANSI/BHMA A156.31 – Electric Strikes and Frame Mounted Actuators (2007).

1.4 SUBMITTALS

- A. Schedules: Provide hardware schedules in vertical format on 8-1/2-inch by 11-inch paper conforming to Door and Hardware Institute (DHI) publication Sequence and Format for the Hardware Schedule using Architect's door numbers and hardware set numbers. Coordinate the final door hardware sets with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
 - 1. Content: Include the following information:
 - a) Identification number, location, hand, fire rating, and material of each door and frame.
 - b) Type, style, function, size, quantity, and finish of each door hardware item.
 - c) Complete designations of every item required for each door or opening including name and manufacturer.

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- d) Fastenings and other pertinent information.
 - e) Location of each door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
 - f) Explanation of abbreviations, symbols, and codes contained in schedule.
 - g) Mounting locations for door hardware.
 - h) Door and frame sizes and materials.
- B. Product Data: Provide manufacturer's catalog and technical data for each hardware item. Highlight design, function, fastening, accessories, and options to facilitate review.
- C. Templates: Provide manufacturer's templating information for mortise and template hardware, and reinforcement requirements for surface applied hardware upon receipt of the approved hardware schedule.
- D. Samples for Verification: Submit minimum 2-by-4-inch plate Samples of each type of finish required, except primed finish.
- E. Samples for Verification: For exposed door hardware of each type, full size. Tag with full description for coordination with the door hardware sets. Submit Samples before, or concurrent with, submission of the final door hardware sets.
- 1. Samples will be returned to Contractor. Units that are acceptable and remain undamaged through submittal, review, and field comparison process may, after final check of operation, be incorporated into the Work, within limitations of keying requirements.
- F. Keying Schedule: Arrange keying meeting with Owner, and finish hardware supplier to determine keying requirements immediately after receipt of finish hardware schedule. Submit keying schedule in compliance with DHI's publication Keying Systems and Nomenclature.
- G. Maintenance Data: Include the following information in a 2-1/2-inch thick binder labeled with project information, date, and name of contact information for the hardware supplier at the date of Substantial Completion.
- 1. Copy of approved hardware schedule
 - 2. Copy of approved keying schedule
 - 3. Catalog data for each product
 - 4. As-installed wiring diagrams for each opening connected to power
 - 5. Parts list for locksets, exit devices, door closers
 - 6. Installation templates and instructions
 - 7. Warranty information

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1.5 QUALITY ASSURANCE

A. Supplier:

1. Furnish hardware from a recognized supplier who has warehousing facility within 100 miles of project location, and who has actively supplied hardware for similar projects in the vicinity for a minimum five years.
2. Supplier shall employ an Architectural Hardware Consultant (AHC), as certified by DHI, on staff full time to administer and supervise project.
3. Scheduling Responsibility: Preparation of door hardware and keying schedules.

B. Architectural Hardware Consultant Qualifications: A person who is currently certified by DHI as an Architectural Hardware Consultant and who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project.

C. Installer: Install hardware using installers who have actively installed commercial hardware and are familiar with hardware installation of type required on this project for a minimum of five years.

D. Source Limitations: Obtain each type and variety of door hardware from a single manufacturer, unless otherwise indicated.

E. Pre-installation Conference: Prior to installation of hardware, conduct conference at Project site to comply with requirements in Division 01 Section-Project Management and Coordination with hardware supplier, and manufacturer's representative of locksets, door closers, and exit devices to instruct the installing personnel on the proper installation techniques for scheduled products.

F. Fire-rated openings: Comply with NFPA 80 requirements for fire doors. Furnish nationally recognized testing agency label or stamp on hardware showing compliance with requirements. Only labeled locks and latches or fire exit hardware can be used on fire rated openings. Where UL requirements conflict with Drawings or Specifications, furnish hardware conforming to the UL requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Check in hardware jointly with hardware supplier, upon delivery to jobsite, against approved hardware schedule. Record shortages or damage and replace or repair. Deliver hardware to be installed during fabrication of doors and frames, prepaid to manufacturer.

B. Storage: Store hardware in a locked, dry, temperature controlled room off the floor on shelves to protect against loss, theft, and damage.

C. Marking and Packaging: Deliver hardware to jobsite in manufacturer's original packaging, tag each item or package separately with identification related to the final door hardware sets,

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and include basic installation instructions, templates, and necessary fasteners with each item or package.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fails in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
 - a. Structural failures including excessive deflection, cracking, or breakage.
 - b. Faulty operation of operators and door hardware.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
2. Warranty Period: Three years from date of Substantial Completion, except as follows:
 - a. Manual Closers: 10 years from date of Substantial Completion.

1.8 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in this Section and door hardware sets indicated in Part 3 "Door Hardware Sets" Article.

1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and products equivalent in function and comparable in quality to named products.
2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.

B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 3 "Door Hardware Sets" Article. Products are identified by using door hardware designations, as follows:

1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in Part 3 "Door Hardware Sets" Article.

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2.2 CONVENTIONAL HINGES

A. Type:

- 1. Five-knuckle, full mortise, ball bearing.
- 2. Heavy weight hinges on entrance doors, heavy doors and doors expected to have high frequency use.

B. Quantity: One pair of hinges for all doors up to 5-feet in height and an additional hinge for every 2-feet and 5-inches of door height or fraction thereof.

C. Size:

- 1. For 1-3/4-inch thick doors up to 3-feet wide: 4-1/2-inches high
- 2. For 1-3/4-inch thick doors up over 3-feet wide: 5-inches high
- 3. For all doors over 1-3/4-inch thick: 5 inches high
- 4. Size in width to minimally clear door trim while allowing door to swing 180-degrees or to nearest adjacent wall.

D. Template Requirements: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units.

E. Hinge Base Metal: Unless otherwise indicated, provide the following:

- 1. Exterior Hinges: Stainless steel, with stainless-steel pin.
- 2. Interior Hinges: Finish on brass/bronze base.
- 3. Interior Fire-rated Door Hinges: Finish on steel base.

F. Hinge Options: Where indicated in door hardware sets or on Drawings:

- 1. Non-removable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed at out-swing lockable doors.
- 2. Corners: Square.

G. Fasteners: Comply with the following:

- 1. Screws: Phillips flat-head; stainless steel wood screws. Finish screw heads to match surface of hinges.

H. Acceptable manufacturers and types:

| | | |
|---------|--------|--------|
| Stanley | Bommer | Hager |
| FBB179 | BB5000 | BB1279 |
| FBB199 | BB5006 | BB1199 |

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2.3 LOCKS AND LATCHES, GENERAL

- A. Accessibility Requirements: Where indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)." ANSI A117.1. FED-STD-795, "Uniform Federal Accessibility Standards."
1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.
- B. Mortise Locks:
1. Conform to ANSI/BHMA A156.13 Series 1000 Operational Grade 1.
 2. Latchbolt with appropriate throw for fire rated doors and pairs of doors in accordance with manufacturer's listing.
 3. Lock functions as specified in hardware sets.
 4. Lever/rose design: LNP at Out Buildings.
 5. Backset: 2-3/4-inches.
 6. Strike single door: ANSI 4-7/8-inch with proper lip length to minimally clear trim.
 7. Strike pair of doors: flat lip strike sized to fit flush with door face.
 8. Furnish wrought box strike.
- C. Acceptable manufacturers and types:

| |
|-------------|
| Sargent |
| 8200 Series |

2.4 LOCK CYLINDERS

- A. Cylinders and Keying: Locks shall be provided to receive 7-pin SFIC Arrow Core provided by Owner as furnished by Klein Lock.
1. Cylinders shall be furnished with cams/tailpieces and blocking rings required for the locking device being furnished.
 2. Provide cylinders for all locksets, exit devices, deadlocks, dogging devices, key switches and auxiliary hardware.
 3. Construction Cores: Provide keyed brass construction cores that are replaceable by permanent cores.
 - a. Turn over control key to Owner's locksmith to remove Construction Cores.
 - b. Owner's locksmith to replace construction cores with permanent cores as directed by Owner.

2.5 CLOSERS

- A. Accessibility Requirements: Where handles, pulls, latches, locks, and other operating devices are indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA),

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Accessibility Guidelines for Buildings and Facilities (ADAAG)." ANSI A117.1. FED-STD-795, "Uniform Federal Accessibility Standards."

- B. Conform to ANSI/BHMA A156.4, Grade 1.
- C. Provide closers with heavy duty parallel arm mounting and hold-opens and auxiliary stop where scheduled.
- D. Provide Delayed Action (DA) at toilet room doors and as scheduled.
- E. Size of Units: Unless otherwise indicated, comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use.
- F. Furnish special templates, spacers, brackets, support shoes, and plates for proper and complete installation.
- G. Acceptable manufacturers and types:

| | | |
|---------|------|--------|
| Stanley | LCN | Norton |
| D-4550 | 4040 | 7500 |

2.6 DOOR STOPS

- A. Provide stops of cast material.
- B. Provide appropriate fasteners for mounting to wall.
- C. Acceptable manufacturers and types:

| | | |
|-------|--------|----------|
| Burns | Trimco | Rockwood |
|-------|--------|----------|

2.7 PROTECTION PLATES

- A. Where bottom rail allows, provide 10-inch high kick plate, and adjust for smaller bottom rail.
 - 1. Material: 0.050-inch thick stainless steel plates with four beveled edges.
 - 2. Countersink screw heads.
 - 3. Width: 1-1/2-inch less door width on stop (push) side, and 1-inch less door width on face (pull side), 4-inches less door width at door with surface vertical rods (with bottom rod).
- B. Acceptable manufacturers and types:

| | | |
|-------|--------|----------|
| Burns | Trimco | Rockwood |
|-------|--------|----------|

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2.8 DOOR GASKETING

- A. General: Provide continuous weather-strip gasketing on exterior doors. Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.
 - 1. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
 - 2. Door Bottoms: Apply to door, forming seal with threshold when door is closed.
- B. Air Leakage: Not to exceed 0.50 cfm per foot of crack length for gasketing other than for smoke control, as tested according to ASTM E 283.
- C. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.
- D. Acceptable Manufacturers:

| | | |
|----------------|-------|-------|
| National Guard | Pemko | Hager |
|----------------|-------|-------|

2.9 THRESHOLDS

- A. Accessibility Requirements: Where thresholds are indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)." ANSI A117.1.
 - 1. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch high.
 - 2. Ramps shall have a running slope no steeper than 1:12.
 - 3. Thresholds shall extend in length from masonry jamb to masonry jamb at saddle type. Panic type thresholds to have return closed ends (RCE).
- B. Acceptable Manufacturers and types:

| | | |
|----------------|-------|-------|
| National Guard | Pemko | Hager |
|----------------|-------|-------|

2.10 FABRICATION

- A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rated labels and as otherwise approved by Architect.
- B. Base Metals: Produce door hardware units of base metal, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18. Do not furnish manufacturer's standard materials or forming methods if different from specified standard.

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- C. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.
 - 1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
 - 2. Secure thresholds with lead expansion shields and stainless steel screws.

NFPA 80 requires locks, latches, surface-mounted top and bottom bolts, and fire exit hardware to be secured with machine screws or through bolts.

2.11 FINISHES

- A. Standard: BHMA A156.18, as indicated in door hardware sets.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean masonry and adjacent surfaces prior to installation of hardware on doors.
- B. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation

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of surface protective trim units with finishing work specified in Division 09 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

3.3 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights indicated as follows unless otherwise indicated or required to comply with governing regulations.
 - 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
- B. Install each door hardware item to comply with DHI's publication Installation Guide for Doors and Hardware using the manufacturer's written instructions and fasteners provided by manufacturer.
- C. Drill and countersink items not factory prepared for fasteners.
- D. Mount closers on room-side of corridor doors, inside of exterior doors. Use necessary arms, brackets, spacers, and plates to accommodate auxiliary hardware and special applications.
- E. Install door assemblies to maintain 1/8-inch clearance at door edge to frame and meeting edge of pairs of doors.
- F. Cut thresholds to profile of door frames with mitered corners and hairline joints. Set thresholds in a bed of mastic sealant, forming tight seal between threshold and surface to which set.

3.4 FIELD QUALITY CONTROL

- A. Secure the services of an Architectural Hardware Consultant to inspect door hardware and report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted. Where hardware is found to be defective, repair or replace with new.

3.5 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation and function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
 - 1. Door Closers: Unless otherwise required by authorities having jurisdiction, adjust sweep period so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.

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3.6 CLEANING AND PROTECTION

- A. Wrap or mask exposed hardware until date of Substantial Completion to avoid exposure to paint, solvents and abuse.
- B. Remove marks and clean adjacent surfaces soiled by door hardware installation.
- C. Clean and polish exposed hardware surfaces in accordance with manufacturer’s recommended methods.
- D. Maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.7 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes. Refer to Division 01 Section "Demonstration and Training."

3.8 DOOR HARDWARE SETS

Set 1

Door #101, 102, 103, 104

| | | | | |
|-------|------------------------------------|----------------------|-------|----|
| 3 ea. | Hinge | FBB199 4.5 x 4.5 NRP | US32D | ST |
| 1 ea. | Dormitory Lockset | 50-72-8225 X LNP | 630 | BE |
| 1 ea. | Closer | D-4550 DA CS SRI | 689 | ST |
| | NOTE: Template for 85 degree stop. | | | |
| 1 ea. | Threshold | 896S | | NG |
| 1 ea. | Door Sweep | 200NA | | NG |
| 1 ea. | Weatherstrip | 156S | | NG |

Set 2

Door #105

| | | | | |
|-------|------------------------------------|----------------------|-------|----|
| 3 ea. | Hinge | FBB199 4.5 x 4.5 NRP | US32D | ST |
| 1 ea. | Service Lockset | 72-8206 X LNP | 630 | BE |
| 1 ea. | Cylinder Pull | 100 | 32DBU | |
| 1 ea. | Closer | 4550 HCS SRI | 689 | ST |
| | NOTE: Template for 85 degree stop. | | | |
| 1 ea. | Threshold | 896S | | NG |
| 1 ea. | Door Sweep | 200NA | | NG |
| 1 ea. | Weatherstrip | 156S | | NG |

END OF SECTION 087100

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SECTION 088000 - GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
 - 1. Windows.
- B. Related Sections:
 - 1. Section 085201 "Custom-Built Wood Windows."

1.3 DEFINITIONS

- A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.
- C. Interspace: Space between lites of an insulating-glass unit.

1.4 PERFORMANCE REQUIREMENTS

- A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Delegated Design: Design glass, including comprehensive engineering analysis according to ASTM E 1300 and the Kentucky Building Code by a qualified professional engineer, using the following design criteria:
 - 1. Design Wind Pressures: Determine design wind pressures applicable to Project according to ASCE/SEI 7, based on heights above grade indicated on Drawings.

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- a. Wind Design Data: As indicated on Drawings.
 - b. Basic Wind Speed: 90 mph.
 - c. Importance Factor: 1.15.
 - d. Exposure Category: C.
2. Vertical Glazing: For glass surfaces sloped 15 degrees or less from vertical, design glass to resist design wind pressure based on glass type factors for short-duration load.
 3. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch, whichever is less.
 4. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

1.5 ACTION SUBMITTALS

- A. Product Data: For each glass product and glazing material indicated.
1. Glass Samples: For insulating glass; 12 inches square.
- B. Glazing Accessory Samples: For gaskets, sealants, and colored spacers, in 12-inch lengths. Install sealant Samples between two strips of material representative in color of the adjoining framing system.
- C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.
- D. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For installers and manufacturers of insulating-glass units with sputter-coated, low-e coatings.
- B. Product Certificates: For glass and glazing products, from manufacturer.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for insulating glass.
- D. Preconstruction adhesion and compatibility test report.
- E. Warranties: Sample of special warranties.

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1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved and certified by coated-glass manufacturer.
- B. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.
- C. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.
- D. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
- E. Source Limitations for Glass: Obtain insulating glass from single source from single manufacturer for each glass type.
- F. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.
- G. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
 - 1. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
- H. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- I. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.
- J. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Install glazing in mockups specified in Section 085200 "Wood Windows"- to match glazing systems required for Project, including glazing methods.
 - 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- K. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

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2. Review temporary protection requirements for glazing during and after installation.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. Comply with insulating-glass manufacturer's written recommendations for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.9 PROJECT CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
 1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or below 40 deg F.

1.10 WARRANTY

- A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form in which coated-glass manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.
 1. Warranty Period: 10 years from date of Substantial Completion.
- B. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form in which insulating-glass manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.
 1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS, GENERAL

- A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.

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1. Minimum Glass Thickness for Exterior Lites: Not less than 6.0 mm.
- B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.
- C. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
 1. For monolithic-glass lites, properties are based on units with lites 6.0 mm thick.
 2. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
 3. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F.
 4. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
 5. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.2 GLASS PRODUCTS

- A. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.
- B. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicated.
 1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
 2. For uncoated glass, comply with requirements for Condition A.
 3. For coated vision glass, comply with requirements for Condition C (other coated glass).
- C. Pyrolytic-Coated, Self-Cleaning, Low-Maintenance Glass: Clear float glass with a coating on first surface having both photocatalytic and hydrophilic properties that act to loosen dirt and to cause water to sheet evenly over the glass instead of beading.

2.3 INSULATING GLASS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide the following: PPG Industries; "Solarban 70 x L," Low-E (MSVD), clear insulating unit.
- B. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190, and complying with other requirements specified.
 1. Sealing System: Dual seal, with manufacturer's standard primary and secondary.
 2. Spacer: Manufacturer's standard spacer material and construction. Color selected by Architect.

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3. Desiccant: Molecular sieve or silica gel, or blend of both.

C. Glass: Comply with applicable requirements in "Glass Products" Article as indicated by designations in "Insulating-Glass Types" Article.

2.4 GLAZING GASKETS

A. Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain watertight seal, made from one of the following:

1. Neoprene complying with ASTM C 864.
2. EPDM complying with ASTM C 864.
3. Silicone complying with ASTM C 1115.
4. Thermoplastic polyolefin rubber complying with ASTM C 1115.

B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned neoprene, EPDM, silicone, or thermoplastic polyolefin rubber gaskets complying with ASTM C 509, Type II, black; of profile and hardness required to maintain watertight seal.

1. Application: Use where soft compression gaskets will be compressed by inserting dense compression gaskets on opposite side of glazing or pressure applied by means of pressure-glazing stops on opposite side of glazing.

2.5 GLAZING SEALANTS

A. General:

1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Dow Corning Corporation; 790.
 - b. GE Advanced Materials - Silicones; SilPruf LM SCS2700.
 - c. Sika Corporation, Construction Products Division; SikaSil-C990.

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2.6 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
 - 1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
 - 2. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.
- B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800.

2.7 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

2.8 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

2.9 MONOLITHIC-GLASS TYPES

- A. Clear, fully tempered float glass.
 - 1. Location: Interior windows and sidelites/door lites.
 - 2. Thickness: 6.0 mm.
 - 3. Provide safety glazing labeling.

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2.10 INSULATING-GLASS TYPES

- A. Low-e-coated, clear insulating glass.
 - 1. Location: Exterior windows and doors.
 - 2. Overall Unit Thickness: 1 inch.
 - 3. Thickness of Each Glass Lite: 6.0 mm.
 - 4. Outdoor Lite: Heat-strengthened float glass.
 - 5. Interspace Content: Argon.
 - 6. Indoor Lite: Heat-strengthened float glass.
 - 7. Low-E Coating: Sputtered on second surface.
 - 8. Visible Light Transmittance: 54 percent minimum.
 - 9. Winter Nighttime U-Factor: 0.28 maximum.
 - 10. Summer Daytime U-Factor: 0.26 maximum.
 - 11. Solar Heat Gain Coefficient: 0.25 maximum.
 - 12. Provide safety glazing labeling where tempered glass is indicated or required.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
 - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
 - 2. Presence and functioning of weep systems.
 - 3. Minimum required face and edge clearances.
 - 4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
- B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that will leave visible marks in the completed work.

3.3 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

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- B. Adjust glazing channel dimensions as required by Project conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.
- C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
- D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- G. Provide spacers for glass lites where length plus width is larger than 50 inches.
 - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
 - 2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- J. Set glass lites with proper orientation so that coatings face exterior or interior as specified.
- K. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- L. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

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- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until right before each glazing unit is installed.
- F. Apply heel bead of elastomeric sealant.
- G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- E. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers

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and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 CLEANING AND PROTECTION

- A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.
- C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.
- D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.
- E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 088000

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SECTION 099113 - EXTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes surface preparation and the application of paint systems on the following exterior substrates:
 - 1. Concrete.
 - 2. Steel.
 - 3. Galvanized metal.
 - 4. Wood.
- B. Related Requirements:
 - 1. Section 099300 "Staining and Transparent Finishing" for surface preparation and the application of wood stains and transparent finishes on exterior wood substrates.

1.3 DEFINITIONS

- A. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- B. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- C. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. Samples for Initial Selection: For each type of topcoat product.
- C. Samples for Verification: For each type of paint system and each color and gloss of topcoat.
 - 1. Submit Samples on rigid backing, 8 inches square.

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2. Label each Sample for location and application area.

D. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
2. Printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
3. VOC content.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

1.6 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
 - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft..
 - b. Other Items: Architect will designate items or areas required.
2. Final approval of color selections will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

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1.8 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Benjamin Moore & Co.
 - 2. ICI Paints.
 - 3. ICI Paints (Canada).
 - 4. PPG Architectural Finishes, Inc.
 - 5. Sherwin-Williams Company.

2.2 PAINT, GENERAL

- A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."
- B. Material Compatibility:
 - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- C. Colors: As selected by Architect from manufacturer's full range.

2.3 PRIMERS/SEALERS

- A. Primer, Bonding, Water Based: MPI #17.
- B. Wood-Knot Sealer: Sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.

2.4 METAL PRIMERS

- A. Primer, Alkyd, Anti-Corrosive for Metal: MPI #79.

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- B. Primer, Galvanized: As recommended in writing by topcoat manufacturer.

2.5 WOOD PRIMERS

- A. Primer, Latex for Exterior Wood: MPI #6.

2.6 WATER-BASED PAINTS

- A. Latex, Exterior Low Sheen (Gloss Level 3-4): MPI #15.

- B. Latex, Exterior Semi-Gloss (Gloss Level 5): MPI #11.

2.7 SOLVENT-BASED PAINTS

- A. Alkyd, Exterior, Semi-Gloss (Gloss Level 5): MPI #94.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Wood: 15 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.

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- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer.
- F. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- G. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- H. Wood Substrates:
 - 1. Scrape and clean knots. Before applying primer, apply coat of knot sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.
 - 2. Sand surfaces that will be exposed to view, and dust off.
 - 3. Prime edges, ends, faces, undersides, and backsides of wood.
 - 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual."
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
 - 3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
 - 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- B. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.

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- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
 - 1. Contractor shall touch up and restore painted surfaces damaged by testing.
 - 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE

- A. Concrete Substrates, Nontraffic Surfaces:
 - 1. Latex System: MPI EXT 3.1A
 - a. Prime Coat: Latex, exterior, matching topcoat.
 - b. Intermediate Coat: Latex, exterior, matching topcoat.
 - c. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4), MPI #15.
- B. Steel Substrates:
 - 1. Alkyd System: MPI EXT 5.10
 - a. Prime Coat: Shop primer, alkyd, anticorrosive for metal, MPI #79.

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- b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
 - c. Topcoat: Alkyd, exterior, semi-gloss (Gloss Level 5), MPI #94.
- C. Galvanized-Metal Substrates:
- 1. Alkyd System: MPI EXT 5.3B
 - a. Prime Coat: Primer, galvanized metal, as recommended in writing by topcoat manufacturer for exterior use on galvanized-metal substrates with topcoat indicated.
 - b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
 - c. Topcoat: Alkyd, exterior, semi-gloss (Gloss Level 5), MPI #94.
- D. Wood Substrates: Including wood trim doors.
- 1. Latex System: MPI EXT 6.3L
 - a. Prime Coat: Primer, latex for exterior wood, MPI #6.
 - b. Intermediate Coat: Latex, exterior, matching topcoat.
 - c. Topcoat: Latex, exterior semi-gloss (Gloss Level 5), MPI #11.

END OF SECTION 099113

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SECTION 099300 - STAINING AND TRANSPARENT FINISHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes surface preparation and application of wood finishes on the following substrates:

- 1. Exterior Substrates:

- a. Exposed glued-laminated beams.
 - b. Exposed dimension lumber (rough carpentry).
 - c. Dressed lumber (finish carpentry).

- 2. Interior Substrates:

- a. Exposed glued-laminated beams.
 - b. Exposed dimension lumber (rough carpentry).
 - c. Dressed lumber (finish carpentry).

- B. Related Requirements: Section 099113 "Exterior Painting" for standard paint systems on exterior substrates.

1.3 DEFINITIONS

- A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- C. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- D. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include preparation requirements and application instructions.

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- B. Samples for Initial Selection: For each type of product indicated.
- C. Samples for Verification: For each type of finish system and in each color and gloss of finish indicated.
 - 1. Submit Samples on representative samples of actual wood substrates, 8 inches square.
 - 2. Label each Sample for location and application area.
- D. Product List: For each product indicated, include the following:
 - 1. Cross-reference to finish system and locations of application areas. Use same designations indicated on Drawings and in schedules.
 - 2. Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the product proposed for use highlighted.
 - 3. VOC content.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Stains and Transparent Finishes: 5 percent, but not less than 1 gal. of each material and color applied.

1.6 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each finish system indicated and each color selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Architect will select one surface to represent surfaces and conditions for application of each type of finish system and substrate.
 - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft..
 - b. Other Items: Architect will designate items or areas required.
 - 2. Final approval of stain color selections will be based on mockups.
 - a. If preliminary stain color selections are not approved, apply additional mockups of additional stain colors selected by Architect at no added cost to Owner.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
 - 1. Maintain containers in clean condition, free of foreign materials and residue.
 - 2. Remove rags and waste from storage areas daily.

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1.8 FIELD CONDITIONS

- A. Apply finishes only when temperature of surfaces to be finished and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply finishes when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
- C. Do not apply exterior finishes in snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Benjamin Moore & Co.
 - 2. Cabot Incorporated, Samuel.
 - 3. ICI Paints.
 - 4. Olympic.
 - 5. PPG Architectural Finishes, Inc.
 - 6. Sherwin-Williams Company.

2.2 MATERIALS, GENERAL

- A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."
- B. Material Compatibility:
 - 1. Provide materials for use within each finish system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a finish system, provide products recommended in writing by manufacturers of topcoat for use in finish system and on substrate indicated.

- C. Stain Colors: Match Architect's samples.

2.3 WOOD FILLERS

- A. Wood Filler Paste: MPI #91.

2.4 PRIMERS AND SEALERS

- A. Primer, Alkyd for Exterior Wood: MPI #5.

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- B. Alkyd, Sanding Sealer, Clear: MPI #102.

2.5 STAINS

- A. Stain, Exterior, Water Based, Semi-Transparent: MPI #156.
- B. Stain, Semi-Transparent, for Interior Wood: MPI #90.
- C. Stain, Exterior, Solvent based, Semi-transparent, MPI #13.

2.6 VARNISHES

- A. Varnish, Exterior, Water Based, Satin-Like (Gloss Level 4), MPI #194.
- B. Varnish, with UV Inhibitor, Exterior, Semi-Gloss (Gloss Level 5), MPI #30.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Exterior Wood Substrates: 15 percent, when measured with an electronic moisture meter.
- C. Maximum Moisture Content of Interior Wood Substrates: 15 percent, when measured with an electronic moisture meter.
- D. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- E. Proceed with finish application only after unsatisfactory conditions have been corrected.
 - 1. Beginning finish application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and finishing.

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1. After completing finishing operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean and prepare surfaces to be finished according to manufacturer's written instructions for each particular substrate condition and as specified.
1. Remove dust, dirt, oil, and grease by washing with a detergent solution; rinse thoroughly with clean water and allow to dry. Remove grade stamps and pencil marks by sanding lightly. Remove loose wood fibers by brushing.
 2. Remove mildew by scrubbing with a commercial wash formulated for mildew removal and as recommended by stain manufacturer.
- D. Exterior Wood Substrates:
1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
 2. Prime edges, ends, faces, undersides, and backsides of wood.
 - a. For varnish coated stained wood, stain edges and ends and prime with varnish. Prime undersides and backsides with varnish.
 3. Countersink steel nails, if used, and fill with putty or plastic wood filler tinted to final color. Sand smooth when dried.
- E. Interior Wood Substrates:
1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
 2. Apply wood filler paste to open-grain woods, as defined in "MPI Architectural Painting Specification Manual," to produce smooth, glasslike finish.
 3. Sand surfaces that will be exposed to view and dust off.
 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

3.3 APPLICATION

- A. Apply finishes according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
1. Use applicators and techniques suited for finish and substrate indicated.
 2. Finish surfaces behind movable equipment and furniture same as similar exposed surfaces.
 3. Do not apply finishes over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- B. Apply finishes to produce surface films without cloudiness, holidays, lap marks, brush marks, runs, ropiness, or other surface imperfections.

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3.4 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing finish application, clean spattered surfaces. Remove spattered materials by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from finish application. Correct damage by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced finished wood surfaces.

3.5 EXTERIOR WOOD-FINISH-SYSTEM SCHEDULE

- A. Exposed rough carpentry substrates (exposed joists, siding, underside of decking, etc.).
 - 1. Semitransparent Stain System: MPI EXT 6.2L
 - a. Prime Coat: Stain, exterior, solvent based, semi-transparent, matching topcoat.
 - b. Topcoat: Stain, exterior, solvent based, semi-transparent, MPI #13.
- B. Finish carpentry substrates (door and window frames, fascias, etc.).
 - 1. Semitransparent Stain System: MPI EXT 6.3D and 6.4D
 - a. Prime Coat: Stain, exterior, solvent based, semi-transparent, matching topcoat.
 - b. Topcoat: Stain, exterior, solvent based, semi-transparent, MPI #13.
- C. Finish carpentry substrates (doors).
 - 1. Varnish over Semitransparent Stain System: MPI EXT 6.3E
 - a. Stain Coat: Stain, exterior, solvent based, semi-transparent, MPI #13.
 - b. First Intermediate Coat: Varnish matching topcoat.
 - c. Second Intermediate Coat: Varnish matching topcoat.
 - d. Topcoat: Varnish, with UV Inhibitor, Exterior, Semi-Gloss (Gloss Level 5), MPI #30.
- D. Exposed Glue-laminated beam substrates.
 - 1. Varnish over Semitransparent Stain System: MPI EXT 6.1D
 - a. Stain Coat: Stain, exterior, water based, semi-transparent, MPI #156.
 - b. First Intermediate Coat: Varnish matching topcoat.
 - c. Second Intermediate Coat: Varnish matching topcoat.
 - d. Topcoat: Varnish, Exterior, Water Based, Satin-Like (Gloss Level 4), MPI #194.

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3.6 INTERIOR WOOD-FINISH-SYSTEM SCHEDULE

- A. Exposed rough carpentry substrates (exposed joists, underside of decking, etc.).
 - 1. Semitransparent Stain System: MPI INT 6.2C
 - a. Prime Coat: Stain, exterior, solvent based, semi-transparent, matching topcoat.
 - b. Topcoat: Stain, exterior, solvent based, semi-transparent, MPI #13.

- B. Exposed Glue-laminated beam substrates.
 - 1. Varnish over Semitransparent Stain System: MPI INT 6.1D
 - a. Stain Coat: Stain, exterior, solvent based, semi-transparent, MPI #13.
 - b. First Intermediate Coat: Varnish matching topcoat.
 - c. Second Intermediate Coat: Varnish matching topcoat.
 - d. Topcoat: Varnish, Exterior, Water Based, Satin-Like (Gloss Level 4), MPI #194.

END OF SECTION 099300

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SECTION 099600 - HIGH-PERFORMANCE COATINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes surface preparation and application of high-performance coating systems on the following substrates:
 - 1. Exterior and Interior Substrates:
 - a. Steel.
 - b. Galvanized metal.
 - c. Aluminum (not anodized or otherwise coated).
- B. Related Sections:
 - 1. Division 09 Section "Staining and Transparent Finishing" for field-applied finishes on wood substrates.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Verification: For each type of coating system and in each color and gloss of finish coat indicated.
 - 1. Submit Samples on rigid backing, 8 inches square.
 - 2. Step coats on Samples to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.
- C. Product List: For each product indicated. Cross-reference products to coating system and locations of application areas. Use same designations indicated on Drawings and in schedules.

1.4 QUALITY ASSURANCE

- A. Master Painters Institute (MPI) Standards:

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1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
 2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and coating systems indicated.
- B. Mockups: Apply benchmark samples of each coating system indicated to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Architect will select one surface to represent surfaces and conditions for application of each type of coating and substrate.
 2. Final approval of color selections will be based on benchmark samples.
 - a. If preliminary color selections are not approved, apply additional benchmark samples of additional colors selected by Architect at no added cost to Owner.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
1. Maintain containers in clean condition, free of foreign materials and residue.
 2. Remove rags and waste from storage areas daily.

1.6 PROJECT CONDITIONS

- A. Apply coatings only when temperature of surfaces to be coated and surrounding air temperatures are between 50 and 95 deg F.
- B. Do not apply coatings in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 HIGH-PERFORMANCE COATINGS, GENERAL

- A. Material Compatibility:
1. Provide materials for use within each coating system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 2. Provide products of same manufacturer for each coat in a coating system.
- B. Colors: Match Architect's sample for top coat.

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2.2 EPOXY COATINGS

- A. High-Build Epoxy Marine Coating, Low Gloss.
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Sherwin-Williams Company; Industrial & Marine, Macropoxy 646, B58W6 Series.

2.3 POLYURETHANE COATINGS

- A. Polyurethane, Two-Component, Pigmented, Semi-Gloss.
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Sherwin-Williams Company; Hi-Solids Polyurethane 100, B65630 Series; Semi-Gloss.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.
 - 1. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 - 2. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
 - 3. Coating application indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Remove plates, machined surfaces, and similar items already in place that are not to be coated. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and coating.
 - 1. After completing coating operations, reinstall items that were removed; use workers skilled in the trades involved.
- C. Clean substrates of substances that could impair bond of coatings, including dirt, oil, grease, and incompatible paints and encapsulants.

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1. Remove incompatible primers and reprime substrate with compatible primers as required to produce coating systems indicated.
- D. Steel Substrates: Remove rust and loose mill scale.
1. Clean using methods recommended in writing by coating manufacturer.
 2. Blast clean according to SSPC-SP 10/NACE No. 2, "Near-White Blast Cleaning."
- E. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied coatings.

3.3 APPLICATION

- A. Apply high-performance coatings according to manufacturer's written instructions.
1. Use applicators and techniques suited for coating and substrate indicated.
 2. Coat surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, coat surfaces behind permanently fixed equipment or furniture with prime coat only.
 3. Coat back sides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 4. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
 5. Paint miscellaneous items including mechanical and electrical components where exposed to view or as directed by Architect.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of the same material are to be applied. Tint undercoats to match color of finish coat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance.
- D. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

3.4 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

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- C. Protect work of other trades against damage from coating operation. Correct damage by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

3.5 EXTERIOR AND INTERIOR HIGH-PERFORMANCE COATING SCHEDULE

A. Steel Metal Substrates:

1. Polyurethane, Pigmented, Over High-Build Epoxy Coating System:

- a. Shop Prime Coat: High Build epoxy marine coating, low gloss – By fabricator.
- b. Intermediate Coat: Polyurethane, two-component, pigmented, semi-gloss.
- c. Topcoat: Polyurethane, two-component, pigmented, semi-gloss.

B. Galvanized Metal Substrates:

1. Polyurethane, Pigmented, Over High-Build Epoxy Coating System:

- a. Prime Coat: High Build epoxy marine coating, low gloss.
- b. Intermediate Coat: Polyurethane, two-component, pigmented, semi-gloss.
- c. Topcoat: Polyurethane, two-component, pigmented, semi-gloss.

END OF SECTION 099600

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SECTION 101426 - EXTERIOR SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Manual on Uniform Traffic Control Devices, latest edition (MUTCD)
- C. Kentucky Department of Highways (KDOH) Standard Specifications for Road and Bridge Construction and Standard Drawings.
- D. Louisville Metro Louisville Loop Design Guidelines, latest edition.

1.2 SUMMARY

- A. General: Provide the labor, tools, equipment, and materials necessary to furnish and install the exterior post and panel signs in accordance with the drawings and specifications.
- B. Section Includes:
 - 1. Nonilluminated single-panel type post and panel signs.
- C. Related Requirements:
 - 1. Section 033000 "Cast-in-Place Concrete" for concrete foundations, concrete fill in postholes, and setting anchor bolts in concrete foundations for signs.
 - 2. Section 321723 "Pavement Markings" striping of pavement and coordination for locating signs.

1.3 SYSTEM DESCRIPTION

- A. Provide and install exterior signage according to the materials, workmanship, and other applicable requirements of the Kentucky Department of Highways (KDOH) Standard Specifications for Road and Bridge Construction and Standard Drawings.
 - 1. Standard Specification: As indicated.
 - 2. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

1.4 QUALITY ASSURANCE

- A. Codes and Standards: Perform all work to furnish and install the exterior post and panel signs in compliance with applicable requirements of governing agencies having jurisdiction and in accordance with the drawings and specifications.

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- B. **Installer Qualifications:** Engage an experienced installer who is an authorized representative of the sign manufacturer and has completed installation of exterior post and panel signs similar in materials, design, and extent to those indicated for the project and that has resulted in construction with a record of successful in-service performance.
- C. **Single-Source Responsibility:** Obtain exterior post and panel signs from a single manufacturer.
- D. **Design Concept:** The size, profiles, and dimensional requirements of post and panel signs are based on the specific type and model indicated in the MUTCD and the Louisville Loop Design Guidelines. Signs by other manufacturers may be considered provided that any deviation of the dimensions and profiles is minor and does not change the design concept as determined by the Engineer/Architect. The burden of proof of equality is the responsibility of the proposer.

1.5 SUBMITTALS

- A. **Product Data:** For each type of product. Include test reports and material certifications as required.
- B. **Shop Drawings:** For post and panel/pylon signage.
 - 1. Include fabrication and installation details and attachments to other work.
 - 2. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
 - 3. Show message list, timesteps, graphic elements, and layout for each sign.
 - 4. Manufacturer's recommendations for maintenance and cleaning requirements for exterior sign surfaces.

1.6 DELIVERY, STORAGE AND HANDLING

- A. **Delivery:** Provide protective covering or crating as recommended by the manufacturer to protect sign components and surfaces against damage during transportation and delivery.
 - 1. Coordinate time of delivery so that pylon signs can be installed within 24 hours of receipt at the project site.
- B. **Handling:** Handle signs carefully to prevent breakage, surface abrasion, denting, soiling, and other defects. Comply with manufacturer's handling instructions for unloading components subject to damage.
 - 1. Inspect sign components for damage upon delivery. Do not install damaged sign components. Repair minor damage to signs provided that the finished repair is equal to the original work in all aspects, and is acceptable to the Architect or Owner. If repairs are not accepted, remove and replace damaged sign components.

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PART 2 - PRODUCTS

2.1 MATERIALS

- A. Aluminum Sheet and Plate: Provide sign substrates as described in Section 833 of the Kentucky Department of highways Standard Specifications for Road and Bridge Construction.
- B. Concrete: Provide concrete for post holes consisting of Portland cement complying with ASTM C 150, aggregates complying with ASTM C 33, and clean water. Mix the materials to obtain concrete with a minimum 28 day compressive strength of 3,000 psi. Use at least four sacks of concrete per cubic yard, 1-inch maximum size aggregate, maximum 3-inch slump, and 2-4 percent entrained air.
- C. Fasteners: Unless otherwise indicated, use concealed fasteners fabricated from metals that are non-corrosive to the sign material and the mounting device.
- D. Anchors and Inserts: Use nonferrous metal or hot-dipped galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete.

2.2 COMPONENTS

- A. Posts: Provide Type I posts as described in Section 832 of the Kentucky Department of Highways (KDOH) Standard Specifications for Road and Bridge Construction and per drawing detail.
 - 1. Post-Mounting Method: Provide posts of length required for permanent installation by the direct burial mounting method.
 - 2. Post-Mounting Method: Provide sign posts of length required for installation with flange or base plate welded to bottom of post for fastening to concrete foundation with anchor bolts. Provide holes in base plate for anchor bolts.
- B. Panels: Provide Panel traffic Signs as described in Section 715 of the Kentucky Department of Highways (KDOH) Standard Specifications for Road and Bridge Construction. Anchoring Materials:

2.3 FABRICATION

- A. General: As described in Section 715 of the Kentucky Department of Highways Standard Specifications for Road and Bridge Construction.

2.4 FINISHES

- A. Provide retroreflective materials as described in Section 830 of the Kentucky Department of highways Standard Specification for Roads and Bridge Construction.

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PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install signs using installation methods indicated and according to manufacturer's written instructions.
 - 1. Install signs level, plumb, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
 - 2. Install signs so they do not protrude or obstruct according to accessibility standard.
 - 3. Before installation, verify that sign components are clean and free of materials or debris that would impair installation.
 - 4. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- B. Excavation: In firm undisturbed or compacted soil, drill or hand-excavate (using a post hole digger) holes for each post to the minimum diameter recommended by the sign manufacturer, but not less than 4 times the largest post cross section.
 - 1. Excavate holes to depths approximately 3 inches lower than the required post bottom, with bottom of posts set not less than 36 inches below finished grade surface.
- C. Setting Posts: Center and align posts in holes 3 inches above the bottom of the excavation
 - 1. Protect portion of post above ground from concrete splatter. Place concrete around posts and vibrate or tamp for consolidation. Check each post for vertical and top alignment and hold in position until concrete has achieved its initial set.
- D. Set anchor bolts and other embedded items required for installation of post and panel signs. Use templates, setting drawing diagrams, instructions, and directions provided by suppliers of items to be attached.
- E. Install signs level, plumb, and at the height indicated or required by local regulation, with sign surfaces free from distortion or other defects in appearance.

3.2 CLEANING

- A. General: At completion of the installation, clean soiled surfaces of sign units in accordance with manufacturer's instructions.

3.3 PROTECTION

- A. General: Protect installed sign units from damage until acceptance by the Owner.

END OF SECTION 101426

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SECTION 102800 - TOILET ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Public-use washroom accessories.

- A. Related Sections:

- 1. Division 26 Section "Electrical" for warm air dryers.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include the following:

- 1. Construction details and dimensions.
- 2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
- 3. Material and finish descriptions.
- 4. Features that will be included for Project.
- 5. Manufacturer's warranty.

- B. Samples: Full size, for each accessory item to verify design, operation, and finish requirements.

- 1. Approved full-size Samples will be returned and may be used in the Work.

- C. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

- 1. Identify products using designations indicated on Drawings.

- D. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Source Limitations: For products listed together in the same articles in Part 2, provide products of same manufacturer unless otherwise approved by Architect.

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- B. Electrical Components, Devices, 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.

1.5 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.6 WARRANTY

- A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, 0.031-inch minimum nominal thickness unless otherwise indicated.
- B. Brass: ASTM B 19 flat products; ASTM B 16, rods, shapes, forgings, and flat products with finished edges; or ASTM B 30, castings.
- C. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.0359-inch minimum nominal thickness.
- D. Galvanized Steel Sheet: ASTM A 653/A 653M, with G60 hot-dip zinc coating.
- E. Galvanized Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- F. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.
- G. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).
- H. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.
- I. ABS Plastic: Acrylonitrile-butadiene-styrene resin formulation.

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2.2 PUBLIC-USE WASHROOM ACCESSORIES

Manufacturers: Subject to compliance with requirements, provide the following:

A. Mirror Unit A:

1. American Specialties-0620.
2. Frame: Stainless steel.
 - a. Corners: Mitered.
3. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.
 - a. Wall bracket of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.
4. Size: 18" wide x 36" high.

B. Liquid-Soap Dispenser B:

1. American Specialties-9343.
2. Description: Designed for dispensing soap in liquid or lotion form.
3. Mounting: Horizontally oriented, surface mounted.
4. Capacity: 48 FL oz.
5. Materials: Satin stainless steel body with black plastic push button.
6. Lockset: Tumbler type.
7. Refill Indicator: Sight gauge.

C. Two-wall L-Shaped Grab Bar C:

1. American Specialties-3700 Type 56.
2. Mounting: Flanges with concealed fasteners.
3. Material: Stainless steel, 0.05 inch thick.
 - a. Finish: Smooth, No. 4, satin finish on ends and slip-resistant texture in grip area.
4. Outside Diameter: 1-1/4 inches.
5. Configuration and Length: Two-wall 36 " x 54".

D. Vertical Grab Bar D:

1. American Specialties-3700 Type 01.
2. Mounting: Flanges with concealed fasteners.
3. Material: Stainless steel, 0.05 inch thick.
 - a. Finish: Smooth, No. 4, satin finish on ends and slip-resistant texture in grip area.
4. Outside Diameter: 1-1/4 inches.

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5. Configuration and Length: Vertical 18".

E. Toilet Tissue (Jumbo-Roll) Dispenser E:

1. American Specialties-0040.
2. Description: Two-roll unit with sliding panel to expose other roll.
3. Mounting: Surface mounted.
4. Capacity: 9- inch- diameter rolls.
5. Material and Finish: ABS plastic, Satin Stainless.
6. Lockset: Tumbler type.
7. Refill Indicator: Pierced slots at front.

F. Warm-Air Dryer F:

1. American Specialties-0195.
2. Mounting: Surface mounted with flush exposed screws.
3. Operation: IR Electronic-sensor activated with timed power cut-off switch.
4. Cover Material and Finish: Cast iron, with white enamel finish.
5. Electrical Requirements: 115 V, 17.6A, 2022 W.

G. Coat Hook G:

1. American Specialties-8425.
2. Description: Single-prong unit.
3. Material and Finish: Alloy 18-8 stainless steel, type 304. Coordinate with door manufacturer.

H. Diaper Changing Station H:

1. American Specialties-9012.
2. Description: Horizontal unit that opens by folding down from stored position with child-protection strap.
3. Material and Finish: light grey polyethylene with concealed hinge.

I. Stainless Steel Panel at Warm-Air Dryer J:

1. Custom Fabricated
2. Material & Finish: 0.625" stainless steel, brushed finish.
3. Fasteners: Concealed fasteners.
4. Size: As indicated on Drawings.

2.3 FABRICATION

A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.

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- B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to method in ASTM F 446.

3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items. Remove temporary labels and protective coatings. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION 102800

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DIVISION 20 - MECHANICAL

SECTION 200100 - GENERAL PROVISIONS - MECHANICAL

PART 1 – GENERAL:

- 1.1 The Advertisement for Bids, Instructions to Bidders, Bidding Requirements, General, Special and Supplementary Conditions, and all other contract documents shall apply to the Contractor's work as well as to each of his Sub-Contractor's work. All manufacturers, suppliers, fabricators, contractors, etc. submitting proposals to any part if for work, services, materials or equipment to be used on or applied to this project are hereby directed to familiarize themselves with all documents pertinent to this Contract. In case of conflict between these General Provisions and the General and/or Special Conditions, the affected Contractor shall contact the Engineer for clarification and final determination.
- 1.2 Each Proposer shall also be governed by any unit prices and Addenda insofar as they may affect part of their work or services.
- 1.3 The work included in this division consists of the furnishing of all labor, equipment, transportation, excavation, backfill, supplies, material, appurtenances and services necessary for the satisfactory installation of the complete and operating Mechanical System(s) indicated or specified in the Contract Documents.
- 1.4 Any materials, labor, equipment or services not mentioned specifically herein which may be necessary to complete or perfect any part of the Mechanical Systems in a substantial manner, in compliance with the requirements stated, implied or intended in the drawings and/or specifications, shall be included as part of this Contract.
- 1.5 It is not the intent of this section of the specifications to make any Contractor, other than the General Contractor, responsible to the Owner, Architect and Engineer. All transactions such as submittal of shop drawings, claims for extra costs, requests for equipment or materials substitution, shall be routed through the General Contractor to the Architect, then to the Engineer. Also, this section of the specifications shall not be construed as an attempt to arbitrarily assign responsibility of work, material, equipment or services to a particular trade or Contractor. Unless stated otherwise, the subdivision and assignment of work under the various sections shall be optional.
- 1.6 It is the intent of this Contract to deliver to the Owner a new project once work is complete. Although plans and specifications are complete to the extent possible, it shall be the responsibility of the Contractors involved to remove and/or relocate or re-attach any existing or new systems which interfere with new equipment or materials required for the complete installation without additional cost to the Owner.
- 1.7 In general, and to the extent possible, all work shall be accomplished without interruption of existing facilities operations. The Contractor shall advise the Owner at least forty-eight (48) hours prior to the interruption of any services (gas, domestic water, heating, etc.). The Owners shall be advised of the exact time that interruption will occur and the length of time the

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interruption will last. Failure to comply with this requirement may result in complete work stoppage by the Contractors involved until a complete schedule of interruptions can be developed.

1.8 Definitions and Abbreviations:

1.8.1 Contractor - Any Contractor whether proposing or working independently or under the supervision of a General Contractor and/or Construction Manager and who installs any type of mechanical work (Controls, Plumbing, HVAC, Sprinkler, Gas Systems, etc.) or, the General Contractor.

1.8.2 Engineer - The Consulting Mechanical-Electrical Engineers either consulting to the Owners, Architect, other Engineers, etc. In this case: CMTA, Inc., Consulting Engineers.

1.8.3 Architect - The Architect of Record for the project.

1.8.4 Furnish - Deliver to the site in good condition and turn over to the Contractor who is to install.

1.8.5 Provide - Furnish and install complete, tested and ready for operation.

1.8.6 Install - Receive and place in satisfactory operation.

1.8.7 Indicated - Listed in the Specifications, shown on the Drawings or Addenda thereto.

1.8.8 Typical - Where indicated repeat this work, method or means each time the same or similar condition occurs whether indicated or not.

1.8.9 Contract Documents - All documents pertinent to the quality and quantity of work to be performed on this project. Includes, but not limited to: Plans, Specifications, Instructions to Bidders, General and Special Conditions, Addenda, Alternates, Lists of Materials, Lists of Sub-Contractors, Unit Prices, Shop Drawings, Field Orders, Change Orders, Cost Breakdowns, Schedules of Value, Periodical Payment Requests, Construction Contract with Owners, etc.

1.8.10 Proposer - Any person, agency or entity submitting a proposal to any person, agency or entity for any part of the work required under this contract.

1.8.11 OSHA - Office of Safety and Health Administration.

1.8.12 IBC - International Building Code.

1.8.13 The Project - All of the work required under this Contract.

1.8.14 NEC - National Electrical Code.

1.8.15 NFPA - National Fire Protection Association.

1.8.16 ASME - American Society of Mechanical Engineers.

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- 1.8.17 AGA - American Gas Association.
- 1.8.18 SMACNA - Sheet Metal and Air Conditioning Contractors National Association.
- 1.8.19 ANSI - American National Standards Institute.
- 1.8.20 ASHRAE - American Society of Heating, Refrigeration and Air Conditioning Engineers.
- 1.8.21 NEMA - National Electrical Manufacturers Association.
- 1.8.22 UL - Underwriters Laboratories.
- 1.8.23 ADA - Americans with Disabilities Act.
- 1.9 Required Notices: Ten days prior to the submission of a proposal, each proposer shall give written notice to the Engineer of any materials or apparatus believed inadequate or unsuitable; in violation of laws, ordinances, rules or regulations of authorities having jurisdiction; and any necessary items of work omitted. In the absence of such written notice, Proposers signify that they have included the cost of all required items in the proposal and that the Proposer will be responsible for the safe and satisfactory operation of the entire system.

PART 2 – INTENT:

- 2.1 It is the intention of the Contract Documents to call for finished work, tested and ready for operation.
- 2.2 Details not usually shown or specified, but necessary for the proper installation and operation of systems, equipment, materials, etc., shall be included in the work, the same as if herein specified or indicated.

PART 3 – DRAWINGS AND SPECIFICATIONS:

- 3.1 The drawings are diagrammatic only and indicate the general arrangement of the systems and are to be followed. If deviations from the layouts are necessitated by field conditions, detailed layouts of the proposed departures shall be submitted to the Engineer for approval before proceeding with the work. The drawings are not intended to show every item which may be necessary to complete the systems. All proposers shall anticipate that additional items may be required and submit their bid accordingly.
- 3.2 The drawings and specifications are intended to supplement each other. No Proposer shall take advantage of conflict between them, or between parts of either. Should this condition exist, the Proposer shall request a clarification not less than twelve days prior to the submission of the proposal so that the condition may be clarified by Addendum. In the event that such a condition arises after work is started, the interpretation of the Engineer shall be final.

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- 3.3 The drawings and specifications shall be considered to be cooperative and anything appearing in the specifications which may not be indicated on the drawings or conversely, shall be considered as part of the Contract and must be executed the same as though indicated by both.
- 3.4 Contractor shall make all his own measurements in the field and shall be responsible for correct fitting. The work shall be coordinated with all other branches of work in such a manner as to cause a minimum of conflict or delay.
- 3.5 The Engineer shall reserve the right to make adjustments in location of piping, ductwork, equipment, etc. where such adjustments are in the interest of improving the project.
- 3.6 Should conflict or overlap (duplication) of work between the various trades become evident, this shall be called to the attention of the Engineer. In such event neither trade shall assume to be relieved of the work which is specified under his branch until instructions in writing are received from the Engineer.
- 3.7 Unless dimensioned, the mechanical drawings only indicate approximate locations of equipment, piping, ductwork, etc. Dimensions given in figures on the drawings shall take precedence over scaled dimensions and all dimensions, whether given in figures or scaled, shall be verified in the field to insure no conflict with other work.
- 3.8 Each Proposer shall review all drawings including Architectural, Mechanical, Electrical, Fire Protection, Landscaping, Structural, Surveys, etc., to insure that the work he intends to provide does not encroach a conflict with or affect the work of others in any way. Where such effect does occur it shall be the Proposer's responsibility to satisfactorily eliminate any such encroachment conflict or effect prior to the submission of his proposal. Each Proposer shall in particular insure that there is adequate space to install his equipment and materials. Failure to do so shall result in the correction of such encroachment conflict or effect of any work awarded the proposer and shall be accomplished fully without expense to others and that they are reasonably accessible for maintenance. Check closely all mechanical and electrical closets, chases, ceiling voids, wall voids, crawl spaces, etc., to insure adequate spaces.
- 3.9 Where on the drawings a portion of the work is drawn out and the remainder is indicated in outline, or not indicated at all, the parts drawn out shall apply to all other like portions of the work. Where ornamentation or other detail is indicated by starting only, such detail shall be continued throughout the courses or parts in which it occurs and shall also apply to all other similar parts of the work, unless otherwise indicated.
- 3.10 Details not usually shown or specified, but necessary for the proper installation and operation of systems, equipment, materials, etc., shall be included in the work, the same as if herein specified or indicated.
- 3.11 Where on the Drawings or Addenda the word typical is used, it shall mean that the work method or means indicated as typical shall be repeated in and each time it occurs whether indicated or not.

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- 3.12 Special Note: Always check ceiling heights indicated on Architectural Drawings and Schedules and insure that they may be maintained after all mechanical and electrical equipment is installed. Do not install equipment in the affected area until the conflict is resolved.

PART 4 - EXAMINATION OF SITE AND CONDITIONS:

- 4.1 Each Proposer shall inform their self of all of the conditions under which the work is to be performed, the site of the work, the structure of the ground, above and below grade, the obstacles that may be encountered, the availability and location of necessary facilities and all relevant matters concerning the work. Each Proposer shall also fully acquaint their self with all existing conditions as to ingress and egress, distance of haul from supply points, routes for transportation of materials, facilities and services, availability of utilities, etc. His proposal shall cover all expenses or disbursements in connection with such matters and conditions. No allowance will be made for lack of knowledge concerning such conditions after bids are accepted.

PART 5 - EQUIPMENT AND MATERIALS SUBSTITUTIONS OR DEVIATIONS:

- 5.1 When any Contractor requests approval of materials and/or equipment of different physical size, weight, capacity, function, color, access, it shall be understood that such substitution, if approved, will be made without additional cost to anyone other than the Contractor requesting the change regardless of changes in connections, space requirements, electrical characteristics, etc. from that indicated, electrical service, etc. In all cases where substitutions affect other trades, the Contractor requesting such substitutions shall advise all such Contractors of the change and shall renumerate them for all necessary changes in their work. Any drawings, Specifications, Diagrams, etc., required to describe and coordinate such substitutions or deviations shall be professionally prepared at the responsible Contractor's expense. Review of Shop Drawings by the Engineers does not in any way absolve the Contractor of this responsibility.
- 5.2 Notwithstanding any reference in the specifications to any article, device, product, material, fixture, form, or type of construction by name, make or catalog number, such reference shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition; any devices, products, materials, fixtures, forms, or types of construction which, in the judgment of the Engineer, are equivalent to those specified are acceptable, provided the provisions of Paragraph (5.1) immediately preceding are met. Requested substitutions shall be submitted to the Engineer a minimum of ten days prior to bids.
- 5.3 Wherever any equipment and material is specified exclusively only such items shall be used unless substitution is accepted in writing by the Engineers.
- 5.4 Each Proposer shall furnish along with his proposal a list of specified equipment and materials which is to be provided. Where several makes are mentioned in the specifications and the Contractor fails to state which they propose to furnish, the Engineer shall choose any of the makes mentioned without change in price. Inclusion in this list shall not insure that the Engineers will approve shop drawings unless the equipment, materials, etc., submitted in shop drawings are satisfactorily comparable to the items specified and/or indicated.

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- 5.5 Required Notices: Ten days prior to the submission of a proposal, each proposer shall give written notice to the Engineer of any materials or apparatus believed inadequate or unsuitable; in violation of laws, ordinances, rules or regulations of authorities having jurisdiction; and any necessary items of work omitted. In the absence of such written notice, Proposers signify that they have included the cost of all required items in the proposal and that the Proposer will be responsible for the safe and satisfactory operation of the entire system.

PART 6 - SUPERVISION OF WORK:

- 6.1 The Contractor shall personally supervise the work for which they are responsible or have a competent superintendent, approved by the Engineers, on the work at all times during progress with full authority to act on behalf of the Contractor.

PART 7 - CODES, RULES, PERMITS, FEES, INSPECTIONS, REGULATIONS, ETC.:

- 7.1 The Contractor shall give all necessary notices, obtain and pay for all permits, government sales taxes, fees, inspections and other costs, including all utility connections, meters, meter settings, taps, tap fees, extensions, etc. in connection with his work. He shall also file all necessary plans, prepare all documents and obtain all necessary approvals of all governmental departments and/or the appropriate municipality or utility company having jurisdiction, whether indicated or specified or not. He shall also obtain all required certificates of inspection for his work and deliver same to the Engineers before request for acceptance and final payment for the work. Ignorance of Codes, Rules, Regulations, Laws, etc. shall not render the Contractor irresponsible for compliance. The Contractor shall also be versed in all Codes, Rules and Regulations pertinent to his part of the work prior to submission of a proposal.
- 7.2 The Contractor shall include in their work, without extra cost, any labor, materials, services, apparatus and drawings in order to comply with all applicable laws, ordinances, rules and regulations, whether or not indicated or specified.
- 7.3 All materials furnished and all work installed shall comply with the National Fire Codes of the National Fire Protection Association, with the requirements of local utility companies, or municipalities and with the requirements of all governmental agencies having jurisdiction.
- 7.4 All materials and equipment so indicated and all equipment and materials for the electrical portion of the mechanical systems shall bear the approval label of, or shall be listed by the Underwriters' Laboratories (UL), Incorporated. Each packaged assembly shall be approved as a package. Approval of components of a package shall not be acceptable.
- 7.5 All plumbing work is to be constructed and installed in accordance with applicable codes, plans and specifications which have been approved in their entirety and/or reflect any changes requested by the State Department of Health. Plumbing work shall not commence until such plans are in the possession of the Plumbing Contractor.
- 7.6 All Heating, Ventilation and Air Conditioning work shall be accomplished in accordance with the International Building Code (IBC) and amendments thereto, the latest standards recognized by

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- the American Society of Heating, Refrigerating and Air Conditioning and the National Fire Protection Association.
- 7.7 The Contractor shall furnish three (3) copies of all Final Inspection Certificates obtained to the Engineer when work is complete. Final payment for work will be contingent upon compliance with this requirement.
- 7.8 Where minimum code requirements are exceeded in the Design, the Design shall govern.
- 7.9 The Contractor shall insure that his work is accomplished in accord with the OSHA Standards and that he conducts his work and the work of his personnel in accord with same.
- 7.10 Work in elevators, elevator shafts and elevator equipment rooms shall comply with the Elevator Code enforced by the state.
- 7.11 All work relating to the handicapped shall be in accord with regulations currently enforced by the Department of Housing, Buildings and Construction, state code and the American Disabilities Act.
- 7.12 All work in conjunction with a natural gas installation shall, in addition to all other Codes, Rules, Regulations, Standards, etc., comply with the requirements of the local gas supplier and/or standards and recommendations of the American Gas Association.
- 7.13 All work in relation to domestic water systems shall, in addition to all other Codes, Rules, Regulations and Standards, be in compliance with the requirements of the local water utility company.
- 7.14 All work in relation to the installation of sanitary or storm sewers shall, in addition to all other Codes, Rules, Regulations and Standards, be in compliance with the local agency governing such installations.
- 7.15 Discharge of any toxic, odorous or otherwise noxious materials into the atmosphere or any system shall be subject to regulations of the Environmental Protection Agency (EPA) and/or the air pollution control commission. If in doubt, contact the State Division.

PART 8 - EQUIPMENT SUPPORT:

- 8.1 Each piece of equipment, apparatus, piping, or conduit suspended from the ceiling or mounted above the floor level shall be provided with suitable structural support, pipe stand, platform or carrier in accordance with the best recognized practice. Such supporting or mounting means shall be provided by the Contractor for all equipment and piping. Exercise extreme care that structural members of building are not overloaded by such equipment. Provide any required additional bracing, cross members, angles, support, etc.

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PART 9 - DUCT AND PIPE MOUNTING HEIGHTS:

- 9.1 All exposed or concealed ductwork, piping, etc., shall be held as high as possible unless otherwise noted and coordinated with all other trades. Exposed piping and ductwork shall, insofar as possible, run perpendicular or parallel to the building structure.

PART 10 - COST BREAKDOWNS (SCHEDULE OF VALUES):

- 10.1 Within thirty days after acceptance of the Contract, the Contractor shall furnish to the Engineer, one copy of a detailed cost breakdown on each respective area of work. These cost breakdowns shall be made in a format approved by the Engineer. Payments will not be made until satisfactory cost breakdowns are submitted.

PART 11 – GUARANTEES AND WARRANTIES:

- 11.1 The Contractor shall guarantee all equipment, apparatus, materials, and workmanship entering into this Contract to the best of its respective kind and shall replace all parts at his own expense, which are proven defective within one year from final acceptance of the work by the Engineer. The effective date of completion of the work shall be the date of the Engineer's Statement of Substantial Completion. Items of equipment which have longer guarantees, as called for in these specifications, shall have warranties and guarantees completed in order, and shall be in effect at the time of final acceptance of the work by the Engineer. The Contractor shall present the Engineer with such warranties and guarantees at the time of final acceptance of the work. The Engineer shall then submit these warranties, etc. to the Owner. The Owner reserves the right to use equipment installed by the Contractor prior to date of final acceptance. Such use of equipment shall not invalidate the guarantee except that the Owner shall be liable for any damage to equipment during this period, due to negligence of his operator or other employees. Refer to other sections for any special or extra warranty requirements.
- 11.2 Provide all warranty certificates to Owner.

PART 12 - CHANGES IN MECHANICAL WORK:

- 12.1 REFER TO GENERAL AND SPECIAL CONDITIONS.

PART 13 - CLAIMS FOR EXTRA COST:

- 13.1 REFER TO GENERAL AND SPECIAL CONDITIONS.

PART 14 - SURVEY, MEASUREMENTS AND GRADE:

- 14.1 The Contractor shall lay out their work and be responsible for all necessary lines, levels, elevations and measurements. The Contractor must verify the figures shown on the drawings before laying out the work and will be held responsible for any error resulting from failure to do so.

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- 14.2 The Contractor shall base all measurements, both horizontal and vertical from established bench marks. All work shall agree with these established lines and levels. Verify all measurements at the site and check the correctness of same as related to the work.
- 14.3 Should the Contractor discover any discrepancy between actual measurements and those indicated which prevents following good practice or the intent of the contract documents, the Contractor shall promptly notify the Engineer and shall not proceed with this work until the Contractor has received instructions from the Engineer on the disposition of the work.

PART 15 - TEMPORARY USE OF EQUIPMENT:

- 15.1 The permanent heating and plumbing equipment, when installed, may be used for temporary services, with the consent of the Engineers. Should the permanent systems be used for this purpose the Contractors shall make all temporary connections required at their expense. They shall also make any replacement required due to damage wear and tear, etc., leaving the same in "as new" condition.
- 15.2 Permission to use the permanent equipment does not relieve the Contractors from the responsibility for any damages to the building construction and/or equipment which might result because of its use.
- 15.3 A pre-start-up conference shall be held with the Architect, Owner, General Contractor and the Mechanical Contractor. Equipment shall not be started until after this meeting.

PART 16 - TEMPORARY SERVICES:

- 16.1 The Contractor shall arrange any temporary water, electrical and other services which he may require to accomplish his work. Refer also to General and Special Conditions.

PART 17 - RECORD DRAWINGS:

- 17.1 The Contractor shall insure that any deviations from the Design are as they occur recorded in red, erasable pencil on record drawings kept at the jobsite. The Engineer shall review the record documents from time to time to insure compliance with this specification. Compliance shall be a contingency of final payment. Pay particular attention to the location of under floor sanitary and water lines, shut-off valves, cleanouts and other appurtenances important to the maintenance and operation of Mechanical Systems. Also, pay particular attention to Deviations in the Control Systems and all exterior utilities. Keep information in a set of drawings set aside at the job site especially for this purpose and deliver to the Engineers upon completion of the work.

PART 18 - MATERIALS AND WORKMANSHIP:

- 18.1 All equipment, materials and articles incorporated in the work shall be new and of comparable quality to that specified. Each Proposer shall determine that the materials and/or equipment he proposes to furnish can be brought into the building(s) and installed within the space available. In certain cases, it may be necessary to remove and replace walls, floors and/or ceilings and this

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work shall be the responsibility of the Contractor. All equipment shall be installed so that all parts are readily accessible for inspection, maintenance, replacement of filters, etc. Extra compensation will not be allowed for relocation of equipment for accessibility or for dismantling equipment to obtain entrance into the building(s). Insure, through coordination that no other Contractor seals off access to space required for equipment materials, etc.

- 18.2 Materials and equipment, where applicable, shall bear Underwriters' Laboratories label where such a standard has been established.
- 18.3 Use extreme care in the selection of equipment and its installation to insure that noise and vibration are kept at a minimum. The Engineer's determination shall be final and corrections to such discrepancies shall be made at the cost of the Contractor.
- 18.4 Each length of pipe, fitting, trap, fixture and device used in the plumbing or drainage systems shall be stamped or indelibly marked with the weight or quality thereof and with the manufacturer's mark or name.
- 18.5 All equipment shall bear the manufacturer's name and address. All electrically operated equipment shall bear a data plate indicating required horsepower, voltage, phase and ampacity. Pumps shall have a data plate indicating horsepower, static pressure head and flow rate.

PART 19 - COOPERATION AND COORDINATION WITH OTHER TRADES:

- 19.1 The Contractor shall give full cooperation to all other trades and shall furnish in writing with copies to the Engineer, any information necessary to permit the work of other trades to be installed satisfactorily and with the least possible interference or delay.
- 19.2 Where any work is to be installed in close proximity to, or will interfere with work of other trades, each shall cooperate in working out space conditions to make a satisfactory adjustment. If so directed by the Engineer, the Contractor shall prepare composite working drawings and sections at a suitable scale not less than $\frac{1}{4}'' = 1'-0''$, clearly indicating how his work is to be installed in relation to the work of other trades, or so as not to cause any interference with work of other trades. He shall make the necessary changes in his work to correct the condition without extra charge.
- 19.3 The Contractor shall furnish to other trades, as required, all necessary templates, patterns, setting plans, and shop details for the proper installation of work and for the purpose of coordinating adjacent work.

PART 20 - QUALIFICATIONS OF CONTRACTOR/WORKMEN:

- 20.1 All mechanical contractors bidding this project must have been a licensed company for a minimum of two years to qualify to bid this project. Individual employee experience does not supersede this requirement.
- 20.2 All mechanical subcontractors bidding the mechanical work must have completed one project of 70% this subcontract cost size and two projects of 50% this subcontract cost size.

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- 20.3 All mechanical work shall be accomplished by qualified workmen competent in the area of work for which they are responsible. Untrained and incompetent workmen, as evidenced by their workmanship, shall be summarily relieved of their responsibilities in areas of incompetency. The Engineer shall reserve the right to determine the quality of workmanship of any workman and unqualified or incompetent workman shall refrain from work in areas not deemed satisfactory. Requests for relief of a workman shall be made through the normal channels of Architect, Contractor, etc.
- 20.4 All plumbing work shall be accomplished by Journeymen Plumbers under the direct supervision of a Master Plumber as defined and clarified under local State Plumbing Law Regulations and Code. Proof and Certification may be requested by the Engineer.
- 20.5 The installation of all Heating, Ventilating and Air-Conditioning Systems (HVAC) by any Contractor, whether in existing or new building construction shall be performed by a Licensed Master HVAC Contractor. This includes any Contractor installing HVAC systems, piping and ductwork.
- 20.6 All sheet metal, insulation and pipe fitting work shall be installed by workmen normally engaged or employed in these respective trades, except where only small amounts of such work are required and are within the competency of workmen directly employed by the Contractor involved.
- 20.7 All automatic control systems shall be installed by workmen normally engaged or employed in this type work, except in the case of minor control requirements (residential type furnaces, packaged HVAC equipment with integral controls, etc.) in which case, if a competent workman is the employee of this Contractor, he may be utilized subject to review of his qualifications by the Engineer and after written approval from same.
- 20.8 All special systems (Automatic Sprinkler Equipment, etc.) shall be installed only by workmen normally engaged in such services. Exception to this specification may only be made in writing by the Engineer.
- 20.9 All electrical work shall be installed pursuant to current State law. (ie. All electrical work shall be installed by licensed electricians).

PART 21- CONDUCT OF WORKMEN:

- 21.1 The Contractor shall be responsible for the conduct of all workmen under his supervision. Misconduct on the part of any workman to the extent of creating a safety hazard, or endangering the lives and property of others, shall result in the prompt relief of that workman. The consumption of alcoholic beverages or other intoxicants, narcotics, barbiturates, hallucinogens or debilitating drugs on the job site is strictly forbidden.

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PART 22 - PROTECTION OF EQUIPMENT:

22.1 The Contractor shall be entirely responsible for all material and equipment they furnish in connection with their work and special care shall be taken to properly protect all parts thereof from damage during the construction period. Such protection shall be by a means acceptable to the Engineer. All piping, etc., shall be properly plugged or capped during construction in a manner approved by the Engineer. Equipment damaged stolen or vandalized while stored on site, either before or after installation, shall be repaired or replaced by the Contractor at their expense.

PART 23 - SCAFFOLDING, RIGGING AND HOISTING:

23.1 The Contractor shall furnish all scaffolding, rigging, hoisting and services necessary for erection and delivery onto the premises of any equipment and apparatus furnished. All such temporary appurtenances shall be set up in strict accord with OSHA Standards and Requirements. Remove same from premises when no longer required.

PART 24 - BROKEN LINES AND PROTECTION AGAINST FREEZING:

24.1 No conduits, piping, troughs, etc. carrying water or any other fluid subject to freezing shall be installed in any part of the building where danger of freezing may exist without adequate protection being given by the Contractor whether or not insulation is specified or indicated on the particular piping. All damages resulting from broken and/or leaking lines shall be replaced or repaired at the Contractor's own expense. If in doubt, contact the Engineer. Do not install piping across or near openings to the outside whether they are carrying static or moving fluids or not. Special Note: Insulation on piping does not necessarily insure that freezing will not occur.

PART 25 – CLEANING:

25.1 The Contractor shall, at all times, keep the area of their work presentable to the public and clean of rubbish and debris caused by his operations; and at the completion of the work, shall remove all rubbish, debris, all of his tools, equipment, temporary work and surplus materials from and about the premises, and shall leave the area clean and ready for use. If the Contractor does not attend to such cleaning upon request, the Engineer may cause cleaning to be done by others and charge the cost of same to the Contractor. The Contractor shall be responsible for all damage from fire which originates in, or is propagated by, accumulations of his rubbish or debris.

25.2 After completion of all work and before final acceptance of the work, the Contractor shall thoroughly clean all equipment and materials and shall remove all foreign matter such as grease, dirt, plaster, labels, stickers, etc., from the exterior of piping, equipment, fixtures and all other associated or adjacent fabrication.

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- 25.3 Ductwork and piping shall be kept clean at all times. Ductwork stored on the job site shall be placed a minimum of 4" above the floor and shall be completely covered in plastic. Installed ductwork shall be protected with plastic. Do not install the ductwork if the building is not "dried-in". If this is required, the entire lengths of duct shall be covered in plastic to protect. The Owner/Engineer shall periodically inspect that these procedures are followed. If deemed unacceptable, the Contractor shall be required to clean the duct system utilizing a NADCA certified Contractor.

PART 26 - CONCRETE WORK:

- 26.1 The Contractor shall be finally responsible for the provisions of all concrete work required for the installation of any of his systems or equipment. The Contractor may, at his option, arrange with the others to provide the work. This option, however, will not relieve the Contractor of his responsibilities relative to dimensions, quality of workmanship, locations, etc. In the absence of other concrete specifications, all concrete related to Mechanical work shall be 3500 psi minimum compression strength at 28 days curing and shall conform to the standards of the American Concrete Institute Publication AC1-318. Heavy equipment shall not be set on pads for at least seven (7) days after pour. Insert 6-inch steel dowel rods into floors to anchor pads.
- 26.2 All concrete pads shall be complete with all pipe sleeves, anchor bolts, reinforcing steel, concrete, etc. as required. Pads larger than 18" in width shall be reinforced with ½" round bars on 6" centers both ways. Bars shall be approximately 3" above the bottom of the pad. All parts of pads and foundations shall be properly rodded or vibrated. If exposed parts of the pads and foundations are rough or show honeycomb after removing forms, all surfaces shall be rubbed to a smooth surface. Chamfer all square edges one-half inch.
- 26.3 In general, concrete pads for equipment shall extend four (4) inches beyond the equipment's base dimensions. Where necessary, extend pads 30 inches beyond base or overall dimensions to allow walking and servicing space.
- 26.4 Exterior concrete pads shall be four (4) inches minimum above grade and four (4) inches below grade on a tamped four (4) inch dense grade rock base unless otherwise indicated or specified. Surfaces of all foundations and bases shall have a smooth finish with one-half (½) inch chamfer on exposed edges. Turn down edges 18" below grade.

PART 27 - NOISE, VIBRATION OR OSCILLATION:

- 27.1 All work shall operate under all conditions of load without any sound or vibration which is objectionable in the opinion of the Engineer. In case of moving machinery, sound or vibration noticeable outside of room in which it is installed, or annoyingly noticeable inside its own room, will be considered objectionable. Sound or vibration conditions considered objectionable by the Engineer shall be corrected in an approved manner by the Contractor at their expense.
- 27.2 All equipment subject to vibration and/or oscillation shall be mounted on vibration supports whether indicated or not suitable for the purpose of minimizing noise and vibration transmission, and shall be isolated from external connections such as piping, ducts, etc. by means of flexible connectors, vibration absorbers, or other approved means. Unitary

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equipment, such as small room heating units, small exhaust fans, etc., shall be rigidly braced and mounted to wall, floor or ceiling as required and tightly gasketed and sealed to mounting surface to prevent air leakage and to obtain quiet operation. Flush and surface mounted equipment such as diffusers, grilles, etc., shall be gasketed and affixed tightly to their mounting surface.

- 27.3 The Contractor shall provide supports for all equipment they furnish. Supports shall be liberally sized and adequate to carry the load of the equipment and the loads of attached equipment, piping, etc. All equipment shall be securely fastened to the structure either directly or indirectly through supporting members by means of bolts or equally effective means. If strength of supporting structural members is questionable, contact Engineers.

PART 28 – ACCESSIBILITY:

- 28.1 The Contractor shall be responsible for the sufficiency of the size of shafts and chases, the adequate clearance in double partitions and hung ceilings for the proper installation of his work. He shall cooperate with all others whose work is in the same space. Such spaces and clearances shall, however, be kept to the minimum size required.
- 28.2 The Contractor shall locate and install all equipment so that it may be serviced, and maintained as recommended by the manufacturer. Allow ready access and removal of the entire unit and/or parts such as valves, filters, fan belts, motors, prime shafts, etc.
- 28.3 The Contractor shall provide in the bid access panels for each concealed shut-off valve, motorized control damper, manual air damper or other device requiring service as shown on engineer's plans or as required. Locations of these panels shall be identified in sufficient time to be installed in the normal course of work.

PART 29 - RESTORATION OF NEW OR EXISTING SHRUBS, PAVING, SURFACES, ETC.:

- 29.1 The Contractor shall at their expense restore to their original conditions all paving, curbing, surfaces, drainage ditches, structures, fences, shrubs, existing or new building surfaces and appurtenances, and any other items damaged or removed by his operations. Replacement and repairs shall be in accordance with good construction practice and shall match materials employed in the original construction of the item and shall be to the satisfaction of the Owner and/or Engineer.

PART 30 - MAINTENANCE OF EXISTING UTILITIES AND LINES:

- 30.1 The locations of all piping, conduits, cables, utilities and manholes existing, or otherwise, that comes within the contract construction site, shall be subject to continuous uninterrupted service with no other exception than the Owner of the utilities permission to interrupt same temporarily.
- 30.2 Utilities and lines, where known, are indicated on the drawings. Locations and sizes are approximate. Prior to any excavation being performed, the Contractor shall ascertain that no

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utilities or lines are endangered by new excavation. Exercise extreme caution in all excavation work.

- 30.3 If utilities or lines occur in the earth within the construction site, the Contractor shall probe and locate the lines prior to machine excavation or blasting in the respective area.
- 30.4 Cutting into existing utilities and services where required shall be done in coordination with and only at times designated by the Owner of the utility.
- 30.5 The Contractor shall repair to the satisfaction of the Owner and Engineer, any surfaces or subsurface improvements damaged during the course of the work, unless such improvement is shown to be abandoned or removed.
- 30.6 Machine excavation shall not be permitted with ten feet of electrical lines or lines carrying combustible and/or explosive materials. Hand excavate only.
- 30.7 Protect all new or existing lines from damage by traffic, etc. during construction. Repairs or replacement of such damage shall be at the sole expense of the party responsible.

PART 31 – WEATHERPROOFING:

- 31.1 Where any work pierces waterproofing including waterproof concrete, the method of installation shall be as approved by the Engineer before work is done. The Contractor shall furnish all necessary sleeves, caulking and flashing required to make openings permanently watertight.

PART 32 - FINAL CONNECTIONS TO EQUIPMENT:

- 32.1 The Contractor shall finally connect to mechanical services (water, gas, air), any terminal equipment, appliances, etc., provided under this and other divisions of the work. Such connections shall be made in strict accord with current codes, safety regulations and the equipment manufacturer's recommendations. If in doubt, contact the Engineers prior to installation.

PART 33 - REQUIRED CLEARANCE FOR ELECTRICAL EQUIPMENT:

- 33.1 The NEC has specific required clearances above, in front, and around electrical gear, panels etc. The Contractor shall not install any piping, ductwork, etc., in the required clearance. If any appurtenance is located in the NEC required clearance, it shall be relocated at no additional cost.

PART 34 – INDEMNIFICATION:

- 34.1 The Contractor shall hold harmless and indemnify the Engineer, employees, officers, agents and consultants from all claims, loss, damage, actions, causes of actions, expense and/or liability resulting from, brought for, or on account of any personal injury or property damage received or sustained by any person, persons, (including third parties), or any property growing out of,

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occurring, or attributable to any work performed under or related to this contract, resulting in whole or in part from the negligence of the Contractor, any subcontractor, any employee, agent or representative.

PART 35 – EQUIPMENT/CONTROLS STARTUP & VERIFICATION:

- 35.1 A pre-start-up conference shall be held with the Architect, Owner, General Contractor, Mechanical Contractor, Electrical Contractor, Controls Contractor, Test and Balance Contractor, and any manufacturer's providing startup services. The purpose of this meeting will be discuss the goals, procedures, etc. for start-up.
- 35.2 Equipment and controls startup and verification shall be required for this project. A specific line-item shall be included on the schedule of values by each Trade for "equipment and controls startup". This line-item value shall be approved by the Engineer. The Engineer, Owner and the Engineer's Field Inspectors shall closely monitor progress and quality of the equipment and controls startup and may withhold pay requests as deemed appropriate.
- 35.3 The Contractor shall include in the bid to provide equipment and controls startup and verification for ALL mechanical systems specified for this project. Specific startup/verification specifications are included throughout the Division 15 specifications. In general, as part of the verification process, equipment suppliers shall perform start-up by their factory authorized technicians (not third party contractors) and shall complete and submit start-up reports/checklists. This shall include rooftop units, VFDs, etc. Submit factory start-up reports to the Engineer. The contractor shall have appropriate trades on site to correct all deficiencies noted by the factory representative. For each deficiency noted, documentation of corrective action (including date and time) shall be submitted to the Engineer and Owner. Where factory start-up is not specified for a particular piece of equipment or system, the Contractor shall be responsible to perform start-up.
- 35.4 Many pieces of equipment and systems are specified with "manufacturer" startup. In general, the manufacturer's recommended startup procedures and checklists will be acceptable for use in the project. Where "manufacturer" startup is not specified, then this Contractor shall perform startup services in strict accordance with manufacturer's instructions. All startup/verification process shall be thoroughly documented by the Contractor and shall include the time and date when performed.

END OF SECTION.

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DIVISION 20 - MECHANICAL

SECTION 200200 - SCOPE OF THE MECHANICAL WORK

PART 1 – GENERAL:

- 1.1 The Mechanical work for this Contract shall include all labor, materials, equipment, fixtures, excavation, backfill and related items required to completely install, test, place in service and deliver to the Owner the complete mechanical systems in accordance with the accompanying plans and all provisions of these specifications. This work shall primarily include, but is not necessarily limited to the following:
 - 1.1.1 Complete storm water service to 5'-0" beyond building footprint. Refer to Civil Drawings/Specifications for additional requirements.
 - 1.1.2 Interior domestic hot, cold and recirculating hot water system.
 - 1.1.3 Interior soil, waste and vent systems.
 - 1.1.4 All plumbing equipment, fixtures and fittings.
 - 1.1.5 All mechanical exhaust systems.
 - 1.1.6 All insulation associated with mechanical systems.
 - 1.1.7 Complete heating and ventilation air systems.
 - 1.1.8 Final connection of all mechanical equipment furnished by others.
 - 1.1.9 All required controls.
 - 1.1.10 All applicable services and work specified in Section 200100; General Provisions - Mechanical.
 - 1.1.11 Provide all required motor starters, etc. not provided under the electrical sections.
 - 1.1.12 Thorough instruction of the owner's maintenance personnel in the operation and maintenance of all mechanical equipment.
 - 1.1.13 Thorough coordination of the installation of all piping, equipment and any other material with other trades to insure that no conflict in installation.
 - 1.1.14 Approved supervision of the mechanical work.
 - 1.1.15 Procurement of all required inspections, including fees for all inspection services and submission of final certificates of inspection to the Engineers (Plumbing, etc.).

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- 1.1.16 Excavation, backfilling, cutting, patching, sleeving, concrete work, etc., required to construct the mechanical systems.
- 1.1.17 Equipment and controls start-up and verification as specified.

END OF SECTION.

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DIVISION 20 - MECHANICAL

SECTION 200300 - REQUIRED SHOP DRAWINGS, DESCRIPTIVE LITERATURE, MAINTENANCE
MANUALS, PARTS LISTS, SPECIAL KEYS & TOOLS

PART 1 – GENERAL:

- 1.1 The Contractor's attention is directed also to the General and Special Conditions and Section 200100 - General Provisions - Mechanical as well as to all other Contract Documents as they may apply to his work.
- 1.2 The Contractor shall prepare and submit to the Engineer, through the General Contractor and the Architect (where applicable) within thirty (30) days after the date of the Contract, a minimum of seven (7) copies of all shop drawings, certified equipment drawings, installation, operating and maintenance instructions, samples, wiring diagrams, etc. on all items of equipment specified hereinafter.
- 1.3 Each shop drawing and/or manufacturers descriptive literature shall have the proper notation indicated on it and shall be clearly referenced to the specifications, schedules, fixture numbers, etc., so that the Engineer may readily determine what the Contractor proposes to furnish. All data and information schedules indicated or specified shall be noted on each copy of each submittal.
- 1.4 Submittal data shall include specification data including metal gauges, finishes, accessories, etc. Also, the submittal data shall include certified performance data, wiring diagrams, dimensional data, and a spare parts list. Submittal data shall be reviewed by the Engineer before any equipment or materials is ordered or any work is begun in the area requiring the equipment.
- 1.5 All submittal data shall have the stamp of approval of the Contractor submitting the data as well as the General Contractor and the Architect (if applicable) to show that the drawings have been reviewed by the Contractor. Any drawings submitted without these stamps of approval may not be considered and will be returned for proper resubmission.
- 1.6 The Contractor shall make any corrections or changes required by the Engineer and shall re-submit for final review as outlined above.
- 1.7 It shall be noted that review of shop drawings by the Engineer applies only to conformance with the design concept of the project and general compliance with the information given in the contract documents. In all cases, the Contractor alone shall be responsible for furnishing the proper quantity of equipment and/or materials required, for seeing that all equipment fits the available space in a satisfactory manner and that piping, electrical and all other connections are suitably located.
- 1.8 The Engineers review of shop drawings, schedules or other required submittal data shall not relieve the Contractor from responsibility for: adaptability of the item to the project; compliance with applicable codes, rules, regulations and information that pertains to fabrication and

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installation; dimensions and quantities; electrical characteristics; and coordination of the work with all other trades involved in this project.

- 1.9 Equipment shall not be ordered and no final rough-in connections, etc., shall be accomplished until reviewed equipment shop drawings are in the hands of the Contractor. It shall be the Contractor's responsibility to obtain reviewed shop drawings and to make all connections, etc. in the neatest and most workmanlike manner possible. The Contractor shall coordinate with all the other trades having any connections, roughing-in, etc. to the equipment.
- 1.10 If the Contractor fails to comply with the requirements set forth above, the Engineer shall have the option of selecting any or all items listed in the Specifications or on the drawings; and the Contractor shall be required to furnish all materials in accordance with this list.
- 1.11 Colors for equipment in other than mechanical spaces shall be selected from the Manufacturer's standard and factory optional colors. Color samples shall be furnished with the shop drawing submission for such equipment.
- 1.12 Shop Drawing Submittals
 - 1.12.1 All submittals for HVAC equipment shall include all information specified. This shall include air and water pressure drops, RPM, noise data, face velocities, horsepower, voltage motor type, steel or aluminum construction, and all accessories clearly marked.
 - 1.12.2 All items listed in the schedules shall be submitted for review in a tabular form similar to the equipment schedule.
 - 1.12.3 All items submitted shall be designated with the same identifying tag as specified on each sheet.
 - 1.12.4 Any submittals received in an unorganized manner without options listed and with incomplete data will be returned for resubmittal.

PART 2 - SHOP DRAWINGS:

- 2.1 Shop Drawings, descriptive literature, technical data and required schedules shall be submitted on the following:

- Plumbing Fixtures, Fittings and Trim
- Floor Drains
- (2.2.1) Exhaust Fans
- (2.2.1) Unit Heaters
- (2.2.1) Hot Water Coils
- (2.2.2&2.2.1) Controls
- Register, Grilles, and Diffusers
- Ductwork Accessories
- Insulation
- (2.2.1) Firestopping Materials and Methods

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2.2 Special Notes:

2.2.1 Upon substantial completion of the project, the Contractor shall deliver to the Engineers (in addition to the required Shop Drawings) three (3) complete copies of operation and maintenance instructions and parts lists for each item marked (1) above. These documents shall include at least:

2.2.1.1 Detailed operating instructions

2.2.1.2 Detailed maintenance instructions including preventive maintenance schedules.

2.2.1.3 Addresses and phone numbers indicating where parts may be purchased.

2.2.1.4 Expanded parts drawings, parts lists, service manuals, schematics, wiring diagrams.

2.2.2 Shop drawings for the Control Systems shall include detailed, scaled plans and schematic diagrams indicating the function and operation of the system.

PART 3 - SPECIAL WRENCHES, TOOLS, ETC.:

3.1 The Contractor shall furnish, along with equipment provided, any special wrenches or tools necessary to dismantle or service equipment or appliances installed under the Contract. Wrenches shall include necessary keys, handles and operators for valves, cocks, hydrants, etc. A reasonable number of each shall be furnished. Provide the following minimally:

3.1.1 Two (2) wall hydrant keys

PART 4 - BALANCE REPORTS:

4.1 Upon substantial completion of the project, the Contractor shall submit to the Engineers four (4) bound copies of the Certified Air Balance Report.

END OF SECTION.

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DIVISION 20 - MECHANICAL

SECTION 200500 - EXCAVATION, TRENCHING, BACKFILLING AND GRADING

PART 1 – GENERAL:

- 1.1 The Contractor's attention is directed to the General and Special Conditions, General Conditions-Mechanical and to all other Contract Documents as they apply to this branch of the work. Attention is also directed to all other sections of the Contract Documents which affect the work of this section and which are hereby made a part of the work specified in this section.
- 1.2 The Contractor shall include all excavating, filling, grading, and related items required to complete their work as shown on the drawings and specified herein or as required to complete, connect and place all mechanical systems in satisfactory operation.
- 1.3 Unless otherwise shown or required, provide separate trenches for sewers, water lines and other underground raceways, with a minimum of 10 feet measured from outside diameter between pipes. In locations, such as close to buildings where separate trenches for sewers and water lines are impractical, lay the water pipe on a solid shelf at least 2'-0" above the top of the sewer and 2'-0" to the side. All exterior lines shall have a minimum earth cover of thirty six (36) inches to top of pipe, unless otherwise indicated.
- 1.4 Water lines crossing under sewer lines, or crossing less than 2 feet above sewer lines, must be encased for a distance not less than 5 feet on either side of the point of crossover.

PART 2 - EARTH AND ROCK CLASSIFICATION:

- 2.1 Materials to be excavated shall be unclassified, and shall include earth, rock, concrete or any other obstructions encountered in trenching to install underground utility pipes. Include all costs for rock removal, including mass rock and trench rock in the bids. No adjustment in the Contract sum will be made on account of the presence or absence of rock, shale, or other materials encountered in the excavating.
- 2.2 Refer to Division 2 - Earthwork, Section 01200 and Civil Drawings for additional information. Site is unclassified.
- 2.3 The contractor shall be responsible for the removal of all materials encountered as required for the installation of the work.
- 2.4 Without regard to the materials encountered, all excavation and materials excavated shall be unclassified. It shall be distinctly understood that references to rock, earth, topsoil or any other excavated or non-excavated material or other material on the construction plans, cross section, contract documents, technical specification or provisions, whether in numbers, words, letters, lines or graphically shown, is solely for information for the Engineer and Owner. This information shall not be taken as an indication of the classification of the material to be excavated, bored or removed by any method, including drilling and blasting, or materials not removed. This information shall not be taken as to the quantity of either rock, earth, topsoil, or

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any other material involved, or the quality of the material such as hardness, wetness, workability or suitability of the material either during excavation and construction or as a material to be reused during construction.

- 2.5 The contractor shall draw his own conclusions as to the surface and sub-surface conditions to be encountered during construction of this project. The Engineer and Owner does not give any guarantee or warranty as to the accuracy of the data shown and no claim will be considered for additional compensation when the materials encountered are not in accord with the information shown.

PART 3 - BENCH MARKS AND MONUMENTS:

- 3.1 Maintain carefully all bench marks, monuments and other reference points. If disturbed or destroyed, replace as directed.

PART 4 – EXCAVATION:

- 4.1 Excavate trenches of sufficient width for proper installation of the work. When the depth of backfill over sewer pipe exceeds 10 feet, keep the trench at the level of the top of the pipe as narrow as practical. Trench excavation for piping eight inches and smaller shall not exceed thirty inch width for exterior lines and twenty-four inch width for interior lines. Excavate to 6" below the bottom of new pipes for installation of compacted grillage.
- 4.2 Sheet and brace trenches as necessary to protect workmen and adjacent structures. Comply with local regulations or, in the absence thereof, with the "Manual of Accident Prevention in Construction" of the Associated General Contractors of America, Inc., and current OSHA Standards. Do not remove sheeting until trench is backfilled sufficiently to protect pipe and prevent injurious caving. Where removal of sheeting and/or bracing is hazardous, leave in place. Cut off such sheeting not to be removed at least 3 feet below finished grade.
- 4.3 Rules and regulations governing the respective utilities shall be observed in executing all work under this heading. Active utilities discovered in the course of excavation shall be protected or relocated in accordance with written instructions from the Engineer. Inactive and abandoned utilities encountered in trenching operations shall be removed and abandoned with ends plugged or capped in accord with current codes and safe practice. If in doubt, contact Engineers. Machine excavation shall not be allowed within ten (10) feet of existing electric lines or lines carrying combustible materials. Use only hand tools.
- 4.4 The removal of rock shall be accomplished by use of hand or power tools only. Blasting shall not be permitted unless authorized in writing by the Engineer. Any damage to existing structures, exterior services, or rock intended for bearing, shall be corrected at the responsible Contractor's expense.
- 4.5 Perform final grading of trench bottoms by hand tools; carry machine excavation only to such depth that soil bearing for pipes and raceways will not be disturbed. Grade the bottom of trenches evenly to insure uniform bearing for all piping and raceways. Cut bell holes as necessary for joints and jointmaking. Except as hereinafter specified, bottom of trenches for

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- bell and spigot pipe, flanged pipe, etc. shall be shaped to the lower quadrant of pipe with additional excavation for bell or flange. Piping installed where it rests on bell or flange and/or is supported with blocks or wedges will not be accepted.
- 4.6 Keep trenches free from water while construction therein is in progress. Under no circumstances lay pipe or appurtenances in water. Pump or bail water from bell holes to permit proper jointing of pipe. Any dewatering from this Contractor's trenches which is required during construction, shall be included in this Contract.
- 4.7 In no case shall excavation work be accomplished that will damage in any way the new structure, existing structures, equipment, utility lines, large trees to remain, etc. The Contractors shall take the necessary steps to prevent flow of eroded earth by water or landslide onto the property of others, or against the structures. The repair of all such damage or any other damage incurred in the course of excavation shall be borne by the responsible Contractor.
- 4.8 Use surveyor's level to establish elevations and grades.
- 4.9 Machine excavation shall be held a sufficient distance from foundations and footings to insure no damage to same. Contractors shall accept full responsibility and pay for repairs and/or replacement of structural members, footings, etc.
- 4.10 The Contractor shall accept the site as it is and remove all trash, rubbish and material from the site prior to starting excavation work.
- 4.11 The Contractor shall provide and maintain barricades and temporary bridges around excavations as required for safety. Temporary bridges shall be provided where excavations cross paved areas and walks. The Contractor shall maintain these bridges in a safe and passable condition for all traffic until removal. Refer to OSHA Standards for such installations and comply with same in all details.
- 4.12 Pay particular attention to existing utilities and lines to avoid damage. The locations of existing lines which are indicated on the plans were taken unconfirmed from drawings prepared for previous construction and locations are approximate only. Also, certain water, gas, electric, storm and sanitary sewer lines and other underground appurtenances, active or abandoned, may not appear on the drawings. It shall be each Mechanical Contractor's responsibility to ascertain the location of all lines and excavate with caution in their area.
- 4.13 Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of Engineer. Unauthorized excavation, as well as remedial work directed by Engineer, shall be at Contractor's expense.

PART 5 – BACKFILL, COMPACTION AND SURFACE REPAIR:

- 5.1 Backfilling for mechanical work shall include all trenches, manhole pits, storage tank pits, and/or any other earth and/or rock openings which are excavated under this Contract. Backfilling shall be carefully performed and the surface restored to its original level to receive new finish. Wherever trenches and earth openings have not been properly filled and/or settlement occurs,

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- they shall be re-excavated, re-filled and properly compacted, smoothed off and finally made to conform to the level of the original ground surface.
- 5.2 All trenches shall be backfilled with 6" of manufactured sand or #8 crushed stone after finished excavation. Install the new pipe on the compacted fill material. Install tracer wire on pipe. Apply any special coatings to the pipe at this point. Also perform all required pressure tests and check the grade of the pipe to ensure that it is correct and free of swags, bows or bends. Once testing is complete, backfill the pipe bed to 12" above the top of the pipe with specified compacted fill material. Backfill the remainder of the trench with earth (debris and rock free) tamped at 6" intervals. Water settling of backfill is permitted only as an aid to mechanical compacting.
 - 5.3 Backfill and compact beneath areas to be seeded or sodded within six (6) inches of finished grade. The remaining six (6) inches shall be backfilled with clean top soil.
 - 5.4 Backfill and compact beneath paved areas, walks, etc. shall be brought to proper grade to receive the sub-base and paving. No paving shall be placed on uncompacted fill or unstable soil.
 - 5.5 Wherever, in the opinion of the Engineer, the soil at or below the requisite pipe grade is unsuitable for supporting piping, special support shall be provided as directed by the Engineer.
 - 5.6 Backfill and compaction for natural gas lines shall be in strict accordance with the local utility company or local municipality's requirements. If in doubt, contact the utility company or local municipality.
 - 5.7 Unsuitable material and surplus excavated material not required for backfill shall be removed from the site. The location of dump and length of haul shall be the affected Contractor's responsibility.
 - 5.8 Provide and place any additional fill material from off the site as may be required for backfill. Fill obtained from off site shall be of kind and quality as specified for backfill and the source approved by the Engineer and shall be brought to the site by the Contractor requiring the fill.
 - 5.9 In the absence (if not specified or indicated elsewhere in the drawings or specifications to be done by others) of such work by others, the Contractor shall lay new sod over his excavation work for existing disturbed grassy areas. Level, compress and water in accord with sound sodding practice.
 - 5.10 Compaction: Control soil compaction during construction providing minimum percentage of density specified for each area classification indicated below.
 - 5.10.1 At a minimum, fill in grass areas shall be compacted to 95% Standard Proctor Density, ASTM D-698, at moisture content between 2 percent below to a 3 percent above the optimum moisture content or as specified in Division 2 – Earthwork; whichever is most stringent.

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5.10.2 At a minimum, fill in concrete or asphalt area shall compacted to 98% Standard Proctor Density, ASTM D-698, at moisture content between 2 percent below to a 3 percent above the optimum moisture content or as specified in Division 2 – Earthwork; whichever is most stringent.

5.11 Place backfill and fill materials evenly adjacent to structures, piping, or conduit to required elevations. Take care to prevent wedging action of backfill against structures or displacement of piping or conduit by carrying material uniformly around structure, piping, or conduit by carrying material uniformly around structure, piping, or conduit to approximately same elevation in each lift.

5.12 Grading:

5.12.1 Grading Outside Building Lines:

5.12.1.1 All materials used for backfill around structures shall be of a quality acceptable to the Engineer and shall be free from large or frozen lumps, large rocks, wood, and other extraneous material. All spaces excavated and not occupied by footings, foundations, walls or other permanent work shall be refilled with earth up to the surface of the surrounding ground, unless otherwise specified, with sufficient allowance for settlement. In making the fills and terraces around the structures, the fill shall be placed in layers not exceeding 8 inches in depth and shall be kept smooth as the work progresses. Each layer of the fill shall be compacted. Sections of the fill immediately adjacent to buildings or structures shall be thoroughly compacted by means of mechanical tamping or hand tamping as may be required by the conditions encountered. All fills shall be placed so as to load structure symmetrically.

5.12.1.2 As set out hereinbefore, rough grading shall be held below finished grade and then the topsoil which has been stockpiled shall be evenly spread over the surface. The grading shall be brought to the levels shown on the Drawings. Final dressing shall be accomplished by hand work or machine work, or a combination of these methods as may be necessary to produce a uniform and smooth finish to all parts of the re-grade. The surface shall be free from clods greater than one inch in diameter. Excavated rock (1" and smaller) may be placed in the fills, but is shall be thoroughly covered. Rock placed in fills shall not be closer than 24 inches from finished grade. Refer to Division 2 – Earthwork.

5.13 Maintenance:

5.13.1 Settling: Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

5.14 Disposal of Excess Non-organic Soil and Rock:

5.14.1 Unless otherwise directed, excess topsoil and subsoil suitable for fill shall remain the property of the Owner and be stockpiled by the Contractor on-site where directed.

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5.14.2 General: Any excess excavated waste material shall become the property of the Contractor and shall be disposed of by the Contractor at no additional cost to the Owner.

PART 6 - MINIMUM DEPTHS OF BURY (TO TOP OF PIPE):

6.1 In the absence of other indication, the following shall be the minimum depth of bury to top of pipe of exterior utility lines. (Check drawings for variations).

6.1.1 Storm Lines 24 inches below final grade.

6.1.2 Sanitary Lines (Exterior) 36 inches below final grade.

6.1.3 All Other Lines Not Listed 36 inches below final grade.

6.2 The minimum bury depth based on initial grade shall be 30 inches.

END OF SECTION.

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DIVISION 20 - MECHANICAL

SECTION 201100 - SLEEVING, CUTTING, PATCHING, AND REPAIRING

PART 1 – GENERAL:

- 1.1 The Contractor's attention is directed to the General and Special Conditions, General Conditions-Mechanical and to all other Contract Documents as they apply to this branch of the work. Attention is also directed to all other sections of the Contract Documents which affect the work of this section and which are hereby made a part of the work specified in this section.
- 1.2 The Contractor shall be responsible for all openings, sleeves, trenches, etc., that he may require in floors, roofs, ceilings, walls, etc., and shall coordinate all such work with the General Contractor and all other trades. Coordinate with the General Contractor, any openings which he is to provide before submitting a bid proposal in order to avoid conflict and disagreement during construction. Improperly located openings shall be reworked at the expense of the Contractor.
- 1.3 The Contractor shall plan his work ahead and shall place sleeves, frames or forms through all walls, floors and ceilings during the initial construction, where it is necessary for piping, ductwork, conduit, etc., to go through; however, when this is not done, the Contractor shall do all cutting and patching required for the installation of his work, or he shall pay other trades for doing this work when so directed by the Engineer. Any damage caused to the buildings by the workmen of the responsible Contractor must be corrected or rectified by him at his own expense.
- 1.4 The Contractor shall notify other trades in due time where he will require openings or chases in new concrete or masonry. He shall set all concrete inserts and sleeves for his work. Failing to do this, he shall cut openings for his work and patch same as required at his own expense.
- 1.5 The Contractor shall be responsible for properly shoring, bracing, supporting, etc., any existing and/or new construction to guard against cracking, settling, collapsing, displacing or weakening while openings are being made. Any damage occurring to the existing and/or new structures, due to failure to exercise proper precautions or due to action of the elements shall be promptly and properly made good to the satisfaction of the Engineer.
- 1.6 All work improperly done or not done at all as required by the Mechanical Trades in this section, will be performed by the General Contractor at the direction of the Contractor whose work is affected. The cost of this work shall be paid for by the Contractor responsible.

PART 2 – SLEEVES:

- 2.1 Cast iron or Schedule 40 (minimum) steel sleeves shall be installed through all walls where pipe enters the building below grade. Sleeves shall be flush with each face of the wall and shall be sufficiently larger than the entering pipe to permit thorough caulking between pipe and sleeve for water proofing.
- 2.2 In all cases, sleeves shall be at least two pipe sizes larger than nominal pipe diameter plus insulation.
- 2.3 Horizontal sleeves passing through exterior walls or where there is a possibility of water leakage

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and damage shall be caulked watertight. Vertical sleeves in roofs shall be flashed and counterflashed with lead (4 lb.) or 16 oz. copper and welded or soldered to piping, lapped over sleeve and properly weather sealed.

- 2.4 Where sleeves pass through roof construction, sleeves shall extend minimum of 8" above the roof. Sleeves through walls and floors shall be cut off flush with inside surface unless otherwise indicated.
- 2.5 Openings thru structural slabs shall be accomplished by means of sleeves. (No drilling will be allowed in structural slabs). In waffle, pre-cast or pan joist construction, openings may be made by means of diamond (core) drilling or as otherwise approved by the Engineers.

PART 3 – CUTTING:

- 3.1 All rectangular or special shaped openings in plaster, stucco or similar materials, including gypsum board, shall be framed by means of plaster frames, casing beads, wood or metal angle members as required. The intent of this requirement is to provide smooth even termination of wall, floor and ceiling finishes as well as to provide a fastening means for grilles, diffusers, lighting fixtures, etc.
- 3.2 The Mechanical Contractor shall coordinate all openings in masonry walls with the General Contractor; and, unless otherwise indicated on the Architectural drawings, shall provide lintels for all openings required for the mechanical work (Louvers, wall boxes, exhaust fans, etc.). Lintels shall be sized as follows:
 - 3.2.1 New Openings under 48" in width: Provide one 3½"x3½"x3/8" steel angle for each 4" of masonry width. Lintel shall have 8" bearing on either side.
 - 3.2.2 New Openings 48" to 96" in width: Provide one 3½"x6"x3/8" steel angle for each 4" of masonry width. Lintel shall have 8" bearing on either side.
 - 3.2.3 New Openings over 96" in width: Consult the Project Structural Engineer.
- 3.3 In existing buildings where the structure is reinforced concrete, special precautions must be taken before core drilling the floors for new pipe and duct penetrations. The floor slab shall be X-Rayed to determine where reinforcing steel is located. The actual pipe penetration location shall be adjusted accordingly at no additional cost to the owner.
- 3.4 No cutting is to be done at points or in a manner that will weaken the structure and unnecessary cutting must be avoided. If in doubt, contact the Engineer.
- 3.5 Pipe openings in slabs and walls shall be cut with core drill. Hammer devices will not be permitted. Edges of trenches and large openings shall be scribe cut with a masonry saw.

PART 4 - PATCHING AND REPAIRING:

- 4.1 Patching and repairing made necessary by work performed under this division shall be included as a part of the work and shall be done by skilled mechanics of the trade or trades for work cut or damaged, in strict accordance with the provisions herein before specified for work of like

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type to match adjacent surfaces and in a manner acceptable to the Engineer.

- 4.2 Where portions of existing lawns, shrubs, paving, etc. are disturbed for installation of work of this Division, such items shall be repaired and/or replaced to the satisfaction of the Engineer.
- 4.3 Where the installation of conduit, ducts, piping, etc. requires the penetration of fire or smoke rated walls, ceilings or floors, the space around such conduit, duct, pipe, etc., shall be tightly filled with an approved non-combustible fire insulating material satisfactory to maintain the rating integrity of the wall, floor or ceilings affected.
- 4.4 Where the installation of ductwork requires the penetration of non-rated floors, the space around the duct or pipe shall be tightly filled with an approved non-combustible material.
- 4.5 Where ducts penetrate fire rated assemblies, fire dampers shall be provided with an appropriate access door.
- 4.6 Piping passing through floors, ceilings and walls in finished areas, unless otherwise specified, shall be fitted with chrome plated brass escutcheons of sufficient outside diameter to amply cover the sleeved openings and an inside diameter to closely fit the pipe around which it is installed.
- 4.7 Stainless steel collars shall be provided around all ducts, flues, breechings, large pipes, etc. at all wall penetrations; both sides.

END OF SECTION.

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DIVISION 20 - MECHANICAL

SECTION 201300 - PIPE, PIPE FITTINGS AND PIPE SUPPORT

PART 1 – GENERAL:

- 1.1 The Contractor's attention is directed to the General and Special Conditions, General Conditions-Mechanical and to all other Contract Documents as they apply to this branch of the work. Attention is also directed to all other sections of the Contract Documents which affect the work of this section and which are hereby made a part of the work specified in this section.
- 1.2 The piping indicated shall be installed complete and shall be of the size indicated. When a pipe size is not indicated, the Contractor shall request the pipe size from the Engineers. All piping shall be installed straight and true, parallel or perpendicular to the building construction. Piping shall be installed so as to allow for expansion without damage to the building finishes, structure, pipe, equipment, etc., use offsets, U-bends or expansion joints as required. Where a section of piping is not indicated but is obviously required for completion of the system, the Contractor shall provide same at no additional cost to the project. No mitered joints or field fabricated pipe bends shall be accepted. Pipe shall clear all windows, doors, louvers and other building openings.
- 1.3 All pipes shall be supported in a neat and workmanlike manner and wherever possible, parallel runs of horizontal piping shall be grouped together on trapeze type hangers. Vertical risers shall be supported at each floor line with approved steel pipe riser clamps. The use of wire or perforated metal to support pipes will not be permitted. Hanging pipes from other pipes shall not be permitted. Spacing of pipe supports shall not exceed eight feet for pipes up to 3 inches and ten feet on all other piping. Small vertical pipes (1 inch and less) shall be bracketed to walls, structural members, etc. at four (4) foot intervals so as to prevent vibration or damage by occupants. Insulated piping shall be supported on a rigid insulation block at each hanger so as to prevent crushing of insulation by hangers. Hangers shall pass completely around the insulation jacket and a steel protective saddle shall be applied to prevent compression of the insulation. (Refer to Specifications Section entitled INSULATION-MECHANICAL).
- 1.4 Where piping rests directly on a hanger, clip, bracket or other means of support, the support element shall be of the same material as the pipe, (e.g., copper to copper, ferrous to ferrous, etc.) or shall be electrically isolated one from the other so as to prevent pipe damage by electrolysis. Pay particular attention and do not allow copper pipe to rest on ferrous structural members, equipment, etc. without electrolytic isolation.
- 1.5 Where plastic piping penetrates a fire rated assembly, it shall be replaced with a threaded metal adapter and metal pipe or whatever means necessary to maintain the separation rating in accordance with local plumbing and fire codes.
- 1.6 Plastic piping or any material with a flame and smoke spread rating not approved for plenum use shall not be permitted in supply, return, relief or exhaust plenums.
- 1.7 Dielectric unions shall be provided at all connections of dissimilar materials.

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- 1.8 In general, piping shall be installed concealed except in Mechanical, Janitor Rooms, etc. unless otherwise indicated, and shall be installed underground or beneath concrete slabs only where indicated. All lines at ceilings shall be held as high as possible and shall run so as to avoid conflicts with other trades, and to facilitate the Owner's use and maintenance. Location of pipe in interior partitions shall be carefully coordinated with whoever will construct the partitions after the piping is in place. Where exposed risers occur they shall be kept as close to walls as possible.
- 1.9 Unless otherwise indicated, all materials shall be new and of the best grade and quality for the type specified.
- 1.10 Installation of pipe shall be in such a manner as to provide complete drainage of the system toward the source. Drain valves shall be provided at all drainage points on pipes. Drain valves shall be ½" size gate type with 3/4" hose thread end and vacuum breaker. Label each drain valve.
- 1.11 Pipe shall be cut accurately to measurements established at the building by the Contractor and worked into place without springing or forcing. All pipes shall be reamed to full pipe diameter before joining and before assembling. All lengths of pipe shall be set vertically and tapped with a hammer to remove scale and dust and inspected to insure that no foreign matter is lodged therein.
- 1.12 All hot and cold water piping shall be kept a sufficient distance apart so as to prevent heat transfer between them. Cold water piping shall also be kept apart from refrigerant hot gas lines.
- 1.13 Piping carrying water or other fluids subject to freezing shall not be installed in locations subject to freezing; if in doubt, consult Engineer.
- 1.14 Piping for all drainage systems shall be installed to permit flow, trapping, and venting in accord with current codes and sound practice.
- 1.15 All increases in vent size at roof shall be by means of service weight cast iron increasers.
- 1.16 Non-metallic piping shall be installed in strict accordance with the manufacturer's instructions. If no such instructions are available, consult Engineers.
- 1.17 Nipples shall be of the same material, composition and weight classification as pipe with which installed.
- 1.18 Where piping is not indicated on the plans, but is obviously or apparently required, contact the Engineers prior to submission of a bid proposal.
- 1.19 Pay particular attention to conflict of piping with other work. Do not install until conflict is resolved. If necessary, contact Engineers.

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- 1.20 Piping materials in each system shall, to the extent practicable, be of the same material. Frequent changes of material (for example, from copper to steel) shall be avoided and in no case shall be accomplished without use of insulating unions and permission of the Engineers.
- 1.21 Apply approved pipe dope (for service intended) to all male threaded joints. The dope shall be listed for such use.
- 1.22 Eccentric reducers shall be used where required to permit proper drainage and venting of pipe lines; bushings shall not be permitted.
- 1.23 All piping shall be capped or plugged during erection as required to keep clean and debris and moisture free.
- 1.24 The entire domestic hot and cold water piping system shall be sterilized in strict accord with requirements of the Department of Health Codes, Rules and Regulations for the State in which the work is being accomplished.
- 1.25 The entire sanitary waste and vent piping system within the building shall be air-tight. If any sewer gases are present within the building, it is the contractor's responsibility to locate and correct this problem completely, and re-tested. Any odor problems within a one year after substantial completion is the responsibility of the contractor to correct.
- 1.26 Site water piping utilized for domestic service shall be filled, cleaned and disinfected. Disinfection shall utilize chlorine per the local water company standards. Hyper-chlorinated water shall be discharged (and diluted if required) at the end of the pipeline into the sanitary sewers per local utility regulations.
- 1.27 Refrigerant piping must be installed to meet the HVAC equipment manufacturer's requirements. A refrigerant piping schematic shall be obtained from the equipment manufacturer which indicates pipe sizes, valves, traps, sight glasses and other required refrigerant specialties. While installing or soldering refrigerant lines, the piping system must be continuously purged with nitrogen. After the piping system is installed, the refrigerant system must be evacuated to 25 microns for eight hours. Contact engineer 72 hours prior to installation of refrigerant lines or evacuation of refrigerant system.

PART 2 - UNIONS AND FLANGES AND WELDED TEES:

- 2.1 Screwed unions, soldered unions or bolted flanges shall be provided as required to permit removal of equipment, valves and piping accessories from the piping system. Keep adequate clearances for coil removal, rodding, tube replacement, motor lubrication, filter replacement, etc. Flanged joints shall be assembled with appropriate flanges, gaskets and bolting. The clearance between flange faces shall be such that the connections can be gasketed and bolted tight without imposing undue strain on the piping system.
- 2.2 Dielectric insulating unions or couplings shall be used wherever the adjoining materials being connected are of dissimilar metals such as connections between copper and steel pipe.

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- 2.3 Tee connections for welded pipe shall be made up with welding fittings. Where the size of the side outlet is such that a different connection technique than on the run is required, a weldolet, sockolet, or threadolet type fitting may be used for the branch in place of reducing tees only where the branch is 2/3 the run size or smaller.

PART 3 - SPECIFICATIONS STANDARDS:

- 3.1 All piping and material shall be new, made in the United States and shall conform to the following minimum applicable standards:
- 3.1.1 Steel pipe; ASTM A-53.
 - 3.1.2 Copper tube; Type K, L, M; ASTM B88-62; Type DWV ASTM B306-62.
 - 3.1.3 Cast iron soil pipe; ASA A-40.1 and CS 188-59.
 - 3.1.4 Cast iron drainage fittings; ASA B16.12.
 - 3.1.5 Cast iron screwed fittings; ASA B16.4.
 - 3.1.6 Welding fittings; ASA B16.9.
 - 3.1.7 Cast brass and wrought copper fittings; ASA B16.18.
 - 3.1.8 Cast brass drainage fittings; ASA B16.23.
 - 3.1.9 Solder; Handy and Harmon, United Wire and Supply; Air Reduction Co. or equivalent.

PART 4 - PITCH OF PIPING:

- 4.1 All piping systems shall be installed so as to drain to a low point. Certain minimum pitches shall be required for this drainage. For proper flow and/or for proper operation, the following pitches shall be required:
- 4.2 Interior Soil, Waste and Vent Piping: ¼ inch per foot in direction of flow where possible but in no case less than 1/8" per foot.
 - 4.3 Exterior Sanitary Lines: Not less than one (1) percent fall in direction of flow and no greater than indicated.
 - 4.4 Condensate Drain Lines From Cooling Equipment: Not less than ¼ inch per foot in direction of flow.
 - 4.5 All Other Lines: Provide ample pitch to a low point to allow 100 percent drainage of the system.

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PART 5 – APPLICATIONS:

5.1 Sanitary Sewer – Exterior:

5.1.1 Schedule 40 PVC pipe with drainage pattern fittings and solvent cement joints made in accordance with the Plumbing Code.

5.1.2 SDR 35 PVC pipe extruded from Type 1, Grade 1 polyvinyl chloride material. PVC pipe shall have a bell type fitting on one end. All joints shall be solvent cement type, made in accordance with the Plumbing Code. (For pipe sizes 8" and greater only.)

5.2 Soil, Waste and Vent Piping (Below Slab)

5.2.1 Schedule 40 PVC pipe with drainage pattern fittings and solvent cement joints made in accordance with the Plumbing Code. PVC pipe will not be allowed in boiler rooms unless otherwise stated on the construction documents.

5.3 Soil, Waste and Vent Piping (Above Slab)

5.3.1 Schedule 40 PVC pipe with drainage pattern fittings and solvent cement joints made in accordance with the Plumbing code.

5.4 Domestic Cold and Hot Water Piping (Above Slab)

5.4.1 Type "L" hard copper tubing with wrought copper fittings with lead free solder equivalent in performance to 95/5. (Maximum lead content of solder and flux is 2%).

5.4.2 Rigid CPVC (chlorinated polyvinyl chloride) vinyl compounds with a Cell Class of 23447-B as identified in ASTM D 1784. Piping shall be schedule 40. Pipe shall be Iron Pipe Size (IPS) conforming to ASTM F 441. Pipe and fittings shall be manufactured as a system and be the product of one manufacturer. Pipe and fittings shall conform to National Sanitation Foundation (NSF) Standard 61 or the health effects portion of Standard 14. Installation shall comply with the latest installation instructions by manufacturer and shall conform to all local plumbing, building, and fire code requirements. Solvent cement joints shall be made in a two step process with primer manufactured for thermoplastic piping systems and solvent cement conforming to ASTM F 493. The system shall be protected from chemical agents, fire stopping materials, thread sealant, plasticized vinyl products, or other aggressive chemical agents not compatible with CPVC compounds. Systems shall be hydrostatically (water) tested after installation.

5.4.3 When CPVC pipe is connected to steel or copper piping, a brass threaded male/female connection shall be used to transition materials. Provide appropriate dielectric union to a black steel pipe where applicable. This shall be a manufactured fitting. No metal threads shall be inserted into CPVC piping or CPVC threads into metal piping.

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5.5 Domestic Cold and Hot Water Piping (Below Slab)

5.5.1 Type "K" hard or soft copper tubing with wrought copper fittings and brazed joints. There shall be no joints beneath slabs.

5.5.2 Rigid CPVC (chlorinated polyvinyl chloride) vinyl compounds with a Cell Class of 23447-B as identified in ASTM D 1784. Piping shall be schedule 40. Pipe shall be Iron Pipe Size (IPS) conforming to ASTM F 441. Pipe and fittings shall be manufactured as a system and be the product of one manufacturer. Pipe and fittings shall conform to National Sanitation Foundation (NSF) Standard 61 or the health effects portion of Standard 14. Installation shall comply with the latest installation instructions by manufacturer and shall conform to all local plumbing, building, and fire code requirements. Solvent cement joints shall be made in a two step process with primer manufactured for thermoplastic piping systems and solvent cement conforming to ASTM F 493. The system shall be protected from chemical agents, fire stopping materials, thread sealant, plasticized vinyl products, or other aggressive chemical agents not compatible with CPVC compounds. Systems shall be hydrostatically (water) tested after installation.

5.5.3 When CPVC pipe is connected to steel or copper piping, a brass threaded male/female connection shall be used to transition materials. Provide appropriate dielectric union to a black steel pipe where applicable. This shall be a manufactured fitting. No metal threads shall be inserted into CPVC piping or CPVC threads into metal piping.

5.6 Condensate Drain Lines

5.6.1 Type "M" copper tubing with sweat fittings and 95/5 solder.

5.7 Air Vent Discharge Lines

5.7.1 Type "L" soft copper; wrought copper fittings, 95/5 solder.

END OF SECTION.

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DIVISION 20 - MECHANICAL

SECTION 202100 - VALVES AND COCKS

PART 1 – GENERAL:

- 1.1 Each Mechanical Contractor's attention is directed to the General and Special Conditions, General Conditions-Mechanical and to all other Contract Documents as they apply to this branch of the work. Attention is also directed to all other sections of the Contract Documents which affect the work of this section and which are hereby made a part of the work specified herein.
- 1.2 Each Mechanical Contractor (and/or Sub-Contractors) shall provide all valves required to control, maintain and direct flow of all fluid systems indicated or specified. This shall include, but may not be limited to all valves of all types including balancing cocks, air cocks, lubricated plug cocks, packed plug cocks, special valves for special systems, etc., for all Mechanical Systems.
- 1.3 All valves shall be designed and rated for the service to which they are applied.
- 1.4 The following type valves shall not be acceptable: Zinc, plastic, fiber or non-metallic.
- 1.5 Each type of valve shall be of one manufacturer, i.e., gate valves, one manufacturer, globe valves, one manufacturer, silent check valves, one manufacturer, etc.. The following valve manufacturers shall be acceptable: Lunkenheimer, Powell, Nibco, Crane, Jenkins, T & S Brass, Walworth, Milwaukee, DeZurik, Consolidated Valve Industries, Inc., Bell & Gossett, Apollo.
- 1.6 All valves shall comply with current Federal, State and Local Codes.
- 1.7 All valves shall be new and of first quality.
- 1.8 Contractor shall provide colored tape on ceiling tile where valves are located above ceiling. Provide access panels where valves are located above hard ceiling.

PART 2 - TYPES AND APPLICATION - DOMESTIC WATER:

- 2.1 Gate Valve (2" and under): Utilize ball valves.
- 2.2 Gate Valve (2-1/2" to 6" size): Gate valve shall have bronze body, bonnet and solid wedge. Gate valve shall be rising stem with bolted bonnet and solid wedge. Valve shall have rated for 150 psi working pressure. Gate valve shall be Nibco T-134 for threaded ends or Nibco S-134 for solder ends.
- 2.3 Globe Valves (2" and under): Globe Valves shall have bronze body, bonnet and disc holder. Globe valve shall have union bonnet, integral seat, teflon or stainless steel renewable disc and be rated for 150 psi working pressure. Globe valve shall be Nibco T-235 for threaded ends or Nibco S-235 for solder ends.

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- 2.4 Check Valve (2" and under): Check valve shall have bronze body, disc and hinge. Check valve shall be Y-pattern type, horizontal swing, renewable disc and rated for 150 psi working pressure. Check valve shall be Nibco T-413 for threaded ends or Nibco S-413 for solder ends.
- 2.5 Ball Valve (2" and under): Ball valve shall have bronze body, ball and reinforced, water tight seat. Valve shall be two piece, swing-out, construction to facilitate inspection and repair. Valve shall be "full-port" type. Valve handle shall only require quarter turn to go from full open to full close. The handle shall be removable with vinyl grip. Valve shall be rated for 180 degrees F water temperature and 150 psi working pressure. Ball valve shall be Nibco T-585 for threaded ends and Nibco S-585 for solder ends.
- 2.6 Strainers (2" and under): Watts 77S Series "Y" type strainer with cast iron body and threaded ends. Screen shall be 20 mesh stainless steel. Strainer shall be provided with cleanout plug and be rated for 200 psi working pressure.
- 2.7 Strainers (2 ½ and larger): Watts 77F Series "Y" type strainer with semi-steel body and flanged ends. Screen shall be 20 mesh stainless steel. Strainer shall be provided with bolted cleanout and be rated for 200 psi working pressure.
- 2.8 Pressure Reducing Valves: Watts #U5B water pressure reading valve with bronze body, bolted bonnet, integral stainless steel strainer and outlet water pressure gauge. Internal disc, diaphragm and stainless steel seat shall all be removable. Valve shall be rated for inlet water pressures up to 300 psi. Water pressure reducing valves shall be provided for all equipment where water pressure exceeds the equipment manufacturer's ratings.
- 2.9 Vacuum Breakers: Watts #288A atmospheric type vacuum breaker with brass body. Vacuum breaker shall be rated for 210 degrees F and 125 psi working pressure and shall meet ASSE Standard 1001.
- 2.10 Double Check Valve: Double check valve shall have bronze body construction and be provided with inlet strainer, (2) gate valves for isolation and (3) test ports. Assembly shall be rated for 110 degrees F water temperature and 175 psi water pressure. Assembly must meet requirements of AWWA Standard C506. Provide Watts #900 with threaded ends for sizes 2" and less. For sizes over 2" provide Watts #709 with flange ends.
- 2.11 Reduced Pressure Backflow Preventers: Watts #909 reduced pressure backflow preventers shall be provided with inlet strainer, (2) gate valves for isolation, (3) test ports and air gap fitting. Assembly shall be rated for 110 degrees F water temperature and 175 psi water pressure. RPBP shall be UL listed and meet AWWA C511 standards. All valves 3" and less in size shall bronze body construction, over 3" in size shall have epoxy coated cast iron bodies. Assemblies 2" and under in size shall have threaded ends, over 2" in size shall have flange ends.

END OF SECTION.

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DIVISION 20 - MECHANICAL

SECTION 202200 - INSULATION - MECHANICAL

PART 1 – GENERAL:

- 1.1 The Contractor's attention is directed to the General and Special Conditions, General Conditions-Mechanical and to all other Contract Documents as they apply to this branch of the work. Attention is also directed to all other sections of the Contract Documents which affect the work of this section and which are hereby made a part of the work specified herein.
- 1.2 Work under this section shall include all labor, equipment, accessories, materials and services required to furnish and install all insulation, fittings and finishes for all mechanical systems specified herein and/or as indicated.
- 1.3 Application of insulation materials shall be done in accordance with manufacturer's written recommendations. Where thickness of insulation is not specified, use applicable thickness recommended by manufacturer for specific use. Insulation shall be applied by a company regularly engaged in the application of insulation and any work deemed unacceptable by the Engineers shall be removed and properly installed at the expense of the Contractor.

PART 2 – MANUFACTURERS:

- 2.1 Insulation shall be as manufactured by Manville, Keene Corp., Knauf, Owens-Corning, Armstrong, World Industries or other approved equivalent. Insulation sundries and adhesives shall be as made by Benjamin Foster, Childers, Vimasco or approved equivalent.

PART 3 - FIRE RATINGS AND STANDARDS:

- 3.1 Insulations, jackets and facings shall have composite fire and smoke hazard ratings as tested by ASTM E-84, NFPA 255 and UL 723 procedures not exceeding Flame Spread 25, Smoke Developed 50 and Fuel Contributed 50.
- 3.2 Adhesives, mastics, tapes and fitting materials shall have component ratings as listed above.
- 3.3 All products and their packaging shall bear a label indicating above requirements are not exceeded.
- 3.4 Duct linings shall meet the Erosion Test Method in compliance with UL Publication No. 181.

PART 4 - GENERAL APPLICATION REQUIREMENTS:

- 4.1 Insulation shall be applied on clean, dry surfaces in a neat and workmanlike manner reflecting the best current practices in the trade. Insulation shall not be applied to piping, ductwork or equipment until tested, inspected and released for insulation.

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- 4.2 Where more than one thickness of insulation is required, joints (both longitudinal and transverse) shall be staggered.
- 4.3 All insulation shall be continuous through walls, ceiling openings and sleeves. However, insulation shall be broken through fire walls. All covered pipe and ductwork is to be located a sufficient distance from walls, other pipe, ductwork and other obstacles to permit the application of the full thickness of insulation specified. If necessary, extra fittings and pipe are to be used. No noticeable deformation of insulation or discontinuity of vapor seal, where required, will be accepted. Coordinate work with plumbers, pipe fitters, etc. to assure hanger locations agree with location of insulation inserts.
- 4.4 "Concealed", where used herein, shall mean hidden from sight as in trenches, chases, furred spaces, pipe shafts, or above hung finished ceilings. "Exposed" shall mean that piping or equipment is not "concealed" as defined above. Piping and equipment in service tunnels, mechanical equipment rooms, storage areas, or unfinished rooms is to be considered as "exposed".
- 4.5 Existing and/or new insulation removed and/or damaged during course of construction shall be repaired or replaced as directed by the Engineer.
- 4.6 Vapor barrier jackets shall be applied with a continuous unbroken vapor seal. Do not use staples thru the jacket. NO EXCEPTIONS!
- 4.7 All insulation shall be installed with joints butted firmly together.
- 4.8 The Contractor shall insure that all insulation (piping, ductwork, equipment, etc.) is completely continuous along all conduits, equipment, connection routes, etc. carrying cold fluids (air, water, other) and that condensation can, in no way, collect in or on the insulation, equipment, conduits, etc. Any such occurrence of condensation collection and/or damage therefrom shall be repaired solely at the expense of the Contractor.

PART 5 - PIPING SYSTEMS:

5.1 GENERAL

- 5.1.1 Bevel insulation and jacket at all points where insulation terminates at unions, flanges, valves and equipment. Note: Applies to hot water lines only; cold water lines require continuous insulation.
- 5.1.2 Pipe insulation shall extend around valve bodies to above drain pans in hydronic equipment over pumps, etc. to insure no condensation drip or collection.
- 5.1.3 Valves, flanges and unions shall only be insulated when installed on piping whose surface temperature will be at or below the dew point temperature of the ambient air.
- 5.1.4 Insulation shall not extend through fire and smoke walls. Pack sleeve at fire and smoke wall with approved fire retardant packing similar to mineral wool.

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5.2 INSULATION SHIELDS AND INSERTS

5.2.1 Metal insulation shields are required at all pipe hangers where the piping is insulated. Metal shields shall be constructed of galvanized steel, formed to a 180 ° arc. Insulation shields shall be the following size:

| PIPE SIZE | SHIELD GAUGE | SHIELD LENGTH |
|-----------------|--------------|---------------|
| 2" AND LESS | 20 | 12" |
| 2 1/2" TO 4" | 18 | 12" |
| 5" TO 10" | 16 | 18" |
| 12" AND GREATER | 14 | 24" |

5.2.2 Insulated pipes 2" in diameter and larger shall be additionally supported with wood inserts of sufficient compressive strength to carry the weight of the pipe and fluid. Inserts shall extend beyond extend beyond the hanger and shall be at least 6" in length.

5.3 PREMOLDED INSULATION FITTING COVERS

5.3.1 Provide Zeston 2000 or equal PVC insulated fitting covers on all pipe fittings, flanges, valves and pipe terminations. Fittings shall be insulated by applying the proper factory precut insulation insert to the pipe fitting. The ends of the insulation insert shall be tucked snugly into the throat of the fitting and the edges adjacent to the pipe insulation tufted and tucked in, fully insulating the pipe fitting. The proper thickness of insulation must be applied to keep the jacket temperature less than 150°F. An approved vapor retarder mastic compatible with the PVC shall be applied around the edges of the adjoining pipe insulation and on the fitting cover throat overlap seam. The PVC fitting cover shall then be applied and secured with pressure sensitive tape along the circumferential edges. The tape shall extend over the adjacent pipe insulation and have an overlap on itself at least 2" on the downward side. On fittings where the operating temperature is below 50°F, two or more layers of the insulation inserts shall be applied with the first layer being secured with a few wrappings of fiber glass yarn to eliminate voids. One addition insert shall be used for each additional 1" of pipe insulation above 1-1/2".

5.4 INSULATION MATERIAL (FOR THE FOLLOWING SYSTEMS)

Insulation shall be Owens-Corning Model 25ASJ/SSL or approved equivalent fiberglass pipe insulation with an all service jacket. The insulation shall be a heavy density, pipe insulation with a K factor not exceeding 0.27 Btu per inch/h.ft² °F at 75°F mean temperature. The insulation shall be wrapped with a vapor barrier jacket. The jacket shall have an inside foil surface with self sealing lap and a water vapor permeability of .02 perm/inch. All circumferential joints shall be vapor sealed with butt strips. All insulation shall be installed in strict accordance with the manufacturer’s recommendations. The following pipes shall be insulated with the thickness of insulation as noted.

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5.4.1 Domestic Water Systems:

- 5.4.1.1 Domestic Cold Water - 1" thick insulation
- 5.4.1.2 Hydronic System Fill Lines From Domestic Cold Water - 1" thick insulation
- 5.4.1.3 Domestic 110°F Hot Water and 110°F Recirculating Hot Water - 1" thick insulation

END OF SECTION.

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DIVISION 20 - MECHANICAL

SECTION 202300 - THERMOMETERS, PRESSURE GAUGES AND
OTHER MONITORING INSTRUMENTS

PART 1 – GENERAL:

- 1.1 The Mechanical Contractor(s) shall include all thermometers, pressure gauges and/or compound gauges at the locations indicated.
- 1.2 All thermometers, pressure gauges and/or compound gauges shall be provided with “PET Cocks” to allow the gauge to be removed and replaced without shutting down system.

PART 2 - THERMOMETERS AND PRESSURE GAUGES:

- 2.1 All thermometers and pressure gauges shall be readable from a standing position on the floor.
- 2.2 Water thermometers shall be Bimetal type with 3" dial, stainless steel case, stainless steel stem and socket with length as required by piping system. Accuracy to be plus or minus 1%. Lens to be plastic. Hot water thermometer shall have a 30°F to 240°F range and chilled water thermometer shall have a 25°F to 125°F range. (Marsh Master Therm or equal.)
- 2.3 Pressure gauges shall be Bourdon Type, circular, 2-1/2" face, black letters on white face graduated in 2 PSI or less and shall be manufactured for service intended. Provide with pig tail connectors and gauge cocks. Accuracy to be plus or minus 2%. Water pressure and low pressure steam gauges shall have 0 to 100 PSI range and medium/high pressure steam gauges shall have 0 to 200 PSI range. (Marsh Acculite II or equal.)
- 2.4 Provide direct mount Bimetal dial thermometers in HVAC ductwork. Thermometer shall be 3" diameter, with acrylic plastic lens and stainless steel case. Air temperature range shall be 25°F to 125°F. (Marsh Master Therm or equal.)
- 2.5 Pressure gauges and thermometers subject to vibration shall be mounted remotely away from vibrating pipe surface, etc. with flexible tubing.
- 2.6 Mount thermometers in approved wells. Do not make direct contact of base with fluid in pipe.
- 2.7 Gauges and thermometers shall be Marsh, Marshalltown, Terice, Weksler or equivalent.

PART 3 - PRESSURE/TEMPERATURE TEST STATION (PETES PLUG):

- 3.1 Provide 1/4" NPT fitting to receive either a temperature or pressure probe, 1/8" OD. Fitting shall be solid brass with two valve cores. (Valve core material to be Neoprene for temperatures up to 200°F and Nordel for temperatures between 200°F and 275°F.). Petes Plugs to have 3" length when installed on insulated pipes and 1-1/2" length for uninsulated pipes. Petes Plug to be fitted with a color coded cap strap with gasket, and shall be rated at 1000 PSIG at 140°F. In addition, the installing contractor shall supply the owner (4) pressure gauges with 1/8" OD

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probe and (4), five-inch stem pocket testing thermometers rated for 25-125°F chilled water and 4, 0-200°F hot water thermometers.

END OF SECTION.

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DIVISION 20 - MECHANICAL

SECTION 202400 - IDENTIFICATIONS, TAGS, CHARTS, ETC.

PART 1 – GENERAL:

- 1.1 Each Mechanical Contractor's attention is directed to the General and Special Conditions, General Conditions-Mechanical and to all other Contract Documents as they apply to this branch of the work. Attention is also directed to all other Contract Documents which affect the work of this section and which are hereby made a part of the work specified herein.

PART 2 - VALVE TAGS AND CHARTS:

- 2.1 Provide and install on each valve in the Mechanical Systems a 1/2" diameter circular brass tag fitted to each valve so that it cannot be removed. Each tag shall be embossed consecutively with letter and number identifiers as to system and purpose respectively. Letter identifiers shall be as follows:

- | | | |
|-------|-----|-------------------------|
| 2.1.1 | DCW | Domestic Cold Water |
| 2.1.2 | DHW | Domestic Hot Water |
| 2.1.3 | RHW | Recirculating Hot Water |

- 2.2 Number identifiers shall be determined by the Contractor sequentially. For example, valve No. HC-1 may be maintenance stops for fan coil units. HC-2 maintenance stops for air heaters, etc.

- 2.3 Provide three (3) copies of typewritten valve charts indicating each valve identifier, the valves purpose and its location. Also furnish one electronic copy on CD. For example: "HC-1 Fan Coil Maintenance Stop-one valve at supply and return of each fan coil unit". One (1) copy of this chart shall be mounted in suitable wood frame(s) with clear plastic or glass covers in a conspicuous location in the Mechanical Room. Two other copies shall be turned over to the Engineers.

- 2.4 Where more than one major Mechanical Room is indicated for the project, install mounted valve schedule in each major Mechanical Room, and repeat only main valves which are to be operated in conjunction with operations of more than single Mechanical Room.

PART 3 - PIPING IDENTIFICATION:

- 3.1 All piping installed shall be identified according to the chart hereinafter specified. Provide stenciled markers and arrows indicating direction of flow on all piping installed under this contract. Markers and arrows shall be painted on the piping using machine cut stencils. All letters shall be sprayed using fast drying lacquer paint. All markers and arrows shall be properly oriented so that descriptive name may be easily read from the floor. Piping shall be identified on twelve foot centers. All piping shall be minimally identified once above all room ceilings and where it passes thru walls or floors. At the Contractor's option, Setmark or equivalent manufactured marking system may be substituted for field marking. The following table

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describes the size of the color field and size of the identification letters which shall be used for pipes of different outside pipe diameters.

| OUTSIDE DIAMETER OF PIPE OR COVERING | LENGTH OF COLOR FIELD | SIZE OF LETTERS |
|--------------------------------------|-----------------------|-----------------|
| INCHES | INCHES | INCHES |
| 3/4 TO 1 1/4 | 8 | 1/2 |
| 1 1/2 TO 2 | 8 | 3/4 |
| 2 1/2 TO 6 | 12 | 1 1/4 |
| 8 TO 10 | 24 | 2 1/2 |
| OVER 10 | 32 | 3 1/2 |

PIPE

ABBREVIATION

Hot Water Supply
Hot Water Return
Domestic Cold Water
Domestic Hot Water
Recirculated Hot Water

H.W.S.
H.W.R.
D.C.W.
D.H.W.
R.H.W.

PART 4 - EQUIPMENT IDENTIFICATION:

4.1 Unless otherwise specified, all equipment shall be identified by stenciling the title of the equipment as taken from the plans in a position that is clearly visible from the floor. The letters shall be made with black paint and shall be not less than two inches high. The titles shall be short and concise and abbreviations may be used as long as the meaning is clear. In finished rooms and mechanical rooms, equipment shall be identified neatly and conspicuously with engraved black lamacoid plates (or equivalent) with 2" high white letters on the front of each piece of equipment.

END OF SECTION.

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DIVISION 20 - MECHANICAL

SECTION 202500 - HANGERS, CLAMPS, ATTACHMENTS, ETC.

PART 1 – GENERAL:

- 1.1 The Contractor's attention is directed to the General and Special Conditions, General Provisions - Mechanical and to all other Contract Documents as they apply to this branch of the work. Attention is also directed to other sections of the Contract Documents which affect the work of this section and which are hereby made a part of the work specified in this section.
- 1.2 Each Contractor's attention is also directed to Section 201300, Pipe, Pipe Fittings and Pipe Support.
- 1.3 This section includes, but is not limited to, furnishing and installing dampers, supports, anchors, and accessories for piping, ductwork, equipment, etc. Furnishing and installing shall be by each trade for the completion of their work.
- 1.4 Power driven anchors and expansion anchors shall be permitted only when permission is granted in writing by the Architect and Engineer.

PART 2 - MATERIALS AND EQUIPMENT:

2.1 Hangers, Clamps, Attachments, Etc.:

| | SIZE | SPECIFICATION |
|----------------|------------------------|--|
| 1. Pipe Rings | 2" pipe and smaller | Adjustable swivel split ring or split pipe ring, Grinnell Figures 104 and 108, Elcen, Fee & Mason, or approved equivalent. |
| 2. Pipe Clevis | 2-1/2" pipe and larger | Adjustable wrought Clevis type, Grinnell Figure 260, Elcen, Fee & Mason, or approved equivalent. |
| 3. Pipe Clevis | All | Steel Clevis for insulated pipe, Elcen Figure 12A, Grinnell, Fee & Mason or approved equivalent. |
| 4. Rise Clamps | All | Extension pipe or riser clamp, Grinnell Figure 261, Elcen, Fee & Mason or approved equivalent. |

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| 5. Beam Clamps and Attachments | All | Grinnell Figure numbers listed or, Elcen, Fee & Mason, or approved equivalent. Malleable beam clamp with extension piece figure 229; I-beam clamp figure 131; C-clamp figures 83, 84, 85, 86, 87, and 88. |
| 6. Brackets | All | Welded steel brackets medium weight, Grinnell Figure 195, Elcen, Fee & Mason or approved equivalent. |
| 7. Concrete Inserts | All | Grinnell Figure numbers listed or, Elcen, Fee & Mason or approved equivalent. Wrought steel insert Figure 280 and wedge type insert Figure 281. |
| 8. Concrete Fasteners | All | Self-drilling concrete inserts, Phillips, Grinnell, Elcen or approved equivalent. |
| 9. Trapeze Hangers | All | Grinnell Figure #46. |
| 10. Rod Attachments | All | Grinnell Figure numbers listed or Elcen, Fee & Mason, or approved equivalent. Extension piece Figure 157, rod coupling Figure 136, and forged steel turnbuckle Figure 230. |
| 11. U-Bolts | All | Standard, U-bolt, Grinnell Figure 137, Elcen, Fee & Mason, or approved equivalent. |
| 12. Welded Pipe Saddles | All | Pipe covering protection saddle sized for thickness of insulation, Grinnell Figure 186, Elcen, Fee & Mason or approved equivalent. |
| 13. Pipe Roll | All | Adjustable swivel pipe roll, Grinnell Figure 174, Elcen, Fee & Mason, or approved equivalent. |
| 14. Protection Saddle | All | Sheet metal pipe protection saddle (See Specification Section 202200, Elcen Figure 219, Fee & Mason, Power Strut, or approved equivalent. |

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| | | |
|------------------------------|-----|---|
| 15. Hanger Rods | All | Steel, diameter of the hanger threading, ASTM A-107. |
| 16. Miscellaneous Steel | All | Steel angles, rods, bars, channels, etc., used in framing for supports and fabricated brackets, anchors, etc., shall conform to ASTM-A-7. |
| 17. Concrete Channel Inserts | All | Continuous slot inserts, Unistrut, or approved equivalent. Heavy duty Series P-3200 or Light Duty Series P-3300 as required. |
| 18. Adjustable Spot Insert | All | Adjustable spot insert Unistrut, or approved equivalent, P-3245. Design load 1000 lbs. |

PART 3 – INSTALLATION:

- 3.1 Unless otherwise specifically indicated or hereinafter specified in the specifications, all supporting, hanging and anchoring of piping, ductwork, equipment, etc., shall be done by each trade as is necessary for completion of the work and shall be as directed in the following paragraphs:
- 3.2 Supporting and hanging shall be done so that excessive load will not be placed on any one hanger so as to allow for proper pitch and expansion of piping. Hangers and supports shall be placed as near as possible to joints, turns and branches.
- 3.3 For concrete construction, utilize adjustable concrete inserts for fasteners. Expansion anchors and power driven devices may be used when approved in writing by the Architect/Engineer. Utilize beam clamps for fastening to steel joists and beams and expansion anchors in masonry construction. When piping is run in joists, piping shall be top mounted on trapeze type hangers with each pipe individually clamped to trapeze hanger.
- 3.4 Trapeze hangers are not allowed, unless specifically approved by the engineer.
- 3.5 Install all miscellaneous steel other than designed building structural members as required to provide means of securing hangers, supports, etc., where piping does not pass directly below or cross steel joists.
- 3.6 Piping shall not be supported by the equipment to which it is connected. Support all piping so as to remove any load or stress from the equipment.
- 3.7 Where piping, etc., is run vertically, approved riser clamps, brackets or other means shall be utilized at approximately 10'-0" center to center minimum and an approved adjustable base stand or fitting on concrete support base shall be utilized at the base of the vertical run.

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- 3.8 Where piping is run along walls, knee braced angle frames or pipe brackets with saddles, clamps, and rollers (where required) mounted on structural brackets fastened to walls or columns shall be used.
- 3.9 Support all ceiling hung equipment, with approved vibration isolators.
- 3.10 Where copper tubing is specified, hangers shall be of copper clad type when piping is uninsulated.
- 3.11 Uninsulated piping hung from above shall be supported with ring and clevis type pipe hangers. Uninsulated piping mounted on trapeze and wall bracket type support shall be held in place with U-bolts. U-bolts shall allow for axial movement in the piping.
- 3.12 All insulated piping shall be supported with clevis type and pipe roll hangers. Hangers shall be sized to allow the pipe insulation to pass through the hangers. Install insulation protection saddles at all hanger locations. Welded pipe saddles shall be installed at all hangers on piping 5" and larger. The pipe saddles shall be sized for the thickness of insulation used. Hangers shall fit snugly around outside of insulation saddles.
- 3.13 Under no conditions will perforated band iron or steel wire driven hangers be permitted.
- 3.14 In general, support piping at the following spacing:
 - 3.14.1 Steel and copper piping - 8 foot intervals for piping 3" and smaller; 10 foot intervals for larger piping.
 - 3.14.2 Schedule 40 plastic pipe: Shall be supported at intervals not to exceed four (4) feet and at the end of the branches and at the change of direction and shall be installed as to permit freedom of movement. Vertical piping shall be supported at their bases and all upward movement shall not be restricted. Hangers shall be at least one (1) inch wide and shall not compress, distort, cut or abrade the piping to allow free movement at all times.
- 3.15 Where fireproofing is dislodged/damaged from the building structures due to contractor installation of hangers, clamps, etc., it shall be the contractor's responsibility to repair all dislodged/damaged fireproofing to original fire proof rating. This shall include all work performed by the contractors sub-contractors as well.

END OF SECTION.

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DIVISION 20 - MECHANICAL

SECTION 203100 - TESTING, BALANCING, LUBRICATION AND ADJUSTMENTS

PART 1 – GENERAL:

- 1.1 The General Conditions, Instructions to Bidders, Section 15000, and other Contract Documents are a part of this specification and shall be binding on all Mechanical Contractors. It shall be each Contractor's responsibility to apprise himself of all information pertinent to his work prior to submitting his proposal. No adjustments will be made in this Contract which is a result of failure to comply with this requirement.
- 1.2 The Engineer, or his authorized representative, shall be notified by the Contractor twenty-four (24) hours in advance of any tests called for in these specifications or required by others. Any leaks or imperfections found shall be corrected and a new tests run to the satisfaction of the Engineer or his authorized representative. Upon completion of a test, a written approval of that part of the work will be given to the Contractor. Only after written approval, signed by the Engineer, shall the Contractor apply insulation or paint or allow his work to be furred-in. This written approval, however, does not relieve the Contractor of the responsibilities for any failure during the guarantee period. The expense of all tests shall be borne by the Contractor, along with all temporary equipment, materials, gauges, etc. required for tests.

PART 2 – PLUMBING:

- 2.1 Piping shall be tested before being insulated or concealed in any manner. Where leaks or defects develop, required corrections shall be made and tests repeated until systems are proven satisfactory.
- 2.2 Water piping systems shall be subjected to a hydrostatic test of one hundred fifty pounds. The system shall be proven tight after a twenty-four (24) hour test.
- 2.3 The house drain line, interior storm sewers, interior rain water conductors, and all soil, waste and vent piping shall be subjected to a hydrostatic test of not less than a 10-foot head or an air test of not less than 5 lbs. per sq. inch using a mercury column gauge and shall hold for 15 minutes.
- 2.4 Exterior sewer lines to the termination point outside the building shall be subject to a ten-foot hydrostatic test or an approved smoke test. These lines shall be subjected to a second test after 2 feet of backfill has been properly installed.
- 2.5 After fixtures have been installed, the entire plumbing system, exclusive of the house sewer, shall be subjected to an air pressure test equivalent to one inch water column and proven tight. The Contractor responsible shall furnish and install all of the test tees required, including those for isolating any portion of the system for tests.
- 2.6 Thermometers and gauges shall be checked for accuracy. If instruments prove defective, they shall be replaced.

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- 2.7 The Contractor shall perform all additional tests that may be required by the Kentucky Department of Health or other governing agency.
- 2.8 Set temperature control on water heaters and adjust tempering valves as required.
- 2.9 Balance the water flow rate of each domestic hot water recirculating pump. Set the flow rate for each balancing valve in the recirculating hot water system. If flow rates are not indicated, contact the engineer for each balance valve GPM.
- 2.10 Any leaks or imperfections found shall be corrected and a new test run until satisfactory results are obtained. The cost of repair or restoration of surfaces damaged by leaks in any system shall be borne by the Contractor.

PART 3 - HEATING, VENTILATING AND AIR CONDITIONING:

- 3.1 The test and balance of this system shall be by a contractor who employs only the services of a certified AABC or independent NEBB firm whose sole business is to perform test and balance services. The test and balance contractor shall report all deficiencies to the engineer.
- 3.2 The Mechanical Contractor shall test all piping before being insulated or concealed in any manner. Where leaks or defects develop, required corrections shall be made and tests repeated until systems are proven satisfactory. Water piping systems shall be subjected to a hydrostatic test of not less than one hundred pounds and shall be proven tight after a twenty-four (24) hour test.
- 3.3 All motors, bearings, etc. shall be checked and lubricated as required during start-up procedures. All automatic, pressure regulating and control valves shall be adjusted. Excessive noise or vibration shall be eliminated. Provide all start-up documents to Designer prior to any test and balance services.
- 3.4 System balancing, where required, shall be performed only by persons skilled in this work. The system shall be balanced as often as necessary to obtain desired system operation and results.
- 3.5 All fan belts shall be adjusted for proper operation of fans.
- 3.6 All deficiencies observed by the Test and Balance Contractor shall be reported immediately to the Engineer and Mechanical Contractor.
- 3.7 For the purpose of placing the heating, ventilating and air conditioning system in operation according to design conditions and certifying same, final testing and balancing shall be performed in complete accordance with AABC Standards for Total System Balance, Volume Six, for air and hydronic systems as published by the Associated Air Balance Council. The following systems shall be test and balance:
 - 3.7.1 Balance all supply, return and exhaust air grille to within 10% of design air flow rate.

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- 3.7.2 Balance all exhaust air fans and record inlet static pressure.
- 3.8 Instruments used for testing and balancing of air and hydronic systems shall have been calibrated within a period of six months prior to balancing. All final test analysis reports shall include a letter of certification listing instrumentation used and last date of calibration.
- 3.9 Test and Balance agency is to provide sizing of fan or motor sheaves required for proper balance. The Mechanical Contractor will purchase and install all sheaves and belts as required. This includes new and existing equipment.
- 3.10 Four (4) copies of the complete test reports shall be submitted to the Consulting Engineer prior to final acceptance of the project. Preliminary test reports shall be submitted when requested.
- 3.11 The Contractor shall provide and coordinate his work in the following manner:
 - 3.11.1 Provide sufficient time before final completion date so that tests and balancing can be accomplished.
 - 3.11.2 Provide immediate labor and tools to make corrections when required without undue delay.
- 3.12 The Contractor shall put all heating and ventilating systems and equipment into full operation and shall continue the operation of same during each working day of testing and balancing.
- 3.13 The test and balance contractor shall be present during the Engineer's final inspection of the building, or a separate project review date. The Engineer may request confirmation of the air balance report by asking for new measurements to be taken at that time. Any information in the test and balance report may be asked to be reconfirmed.

END OF SECTION.

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DIVISION 22 - PLUMBING

SECTION 220100 - PLUMBING SPECIALTIES

PART 1 – GENERAL:

- 1.1 The Contractor's attention is directed to the General and Special Conditions, General Conditions-Mechanical and to all other Contract Documents as they apply to this branch of the work. Attention is also directed to all other sections of the Contract Documents which affect the work specified in this section.
- 1.2 The Contractor shall provide all equipment and specialties complete with trim required and connect in a manner conforming to the State Plumbing Code.
- 1.3 The Contractor shall obtain exact centerline rough-in dimensions between partitions, walls, etc. as required for lay-out of his rough-in work. All work shall be roughed-in so that all exposed piping will be straight and true without bends or offsets.
- 1.4 All equipment and specialties shall be new unless other wise indicated or specified. They shall also be of equivalent quality, dimensions, material, etc. as those specified.
- 1.5 All equipment and specialties shall be installed as recommended by the manufacturer.
- 1.6 Prior to final inspection, test by operation at least twice, all equipment.
- 1.7 Prior to final inspection, remove all stick-on labels, dirt, grease, other removable stampings, lettering, etc. from equipment and specialties and thoroughly clean same.
- 1.8 All equipment and specialties shall be installed in a neat and workmanlike manner. Unacceptable workmanship shall be removed and replaced at the installing Contractor's cost.

PART 2 - DRAINAGE SPECIALTIES:

- 2.1 General: Provide all drainage specialties indicated, specified and/or required to provide complete and acceptable removal of all storm, sanitary, waste, laboratory waste, etc. from the building and into approved receptors. Drainage specialties shall be on non-electrolytic conduction to the material to which they are connected. Drainage specialties shall be installed in a manner so as to insure no leakage of toxic or odorous gases or liquids and shall have traps and/or backflow preventers where required. Nor shall they allow backflow into other or existing systems.
- 2.2 Cleanouts – Interior (CO): In addition to cleanouts indicated, provide cleanouts in soil and waste piping and storm drainage at the following minimum locations:
 - 2.2.1 At base of each stack.
 - 2.2.2 At fifty (50) foot maximum intervals in horizontal lines.

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- 2.2.3 At each change of direction of a horizontal line.
- 2.2.4 As required by current State Plumbing/Building Codes.
- 2.2.5 As required to permit rodding of entire system. (If in doubt, contact Engineers.)
- 2.2.6 Water closets, sinks and other fixtures with fixed traps shall not be accepted as cleanouts.
- 2.2.7 Cleanouts and/or test tees concealed in inaccessible pipe spaces, walls and other locations shall have an eight (8) inch by eight (8) inch (minimum) access panel or cover plates shall be set flush with finished floors and walls and shall be key or screw driver operable.
- 2.2.8 Access panels for cleanouts shall be of the Zurn, 1460 series or equivalent by Josam or Wade. Where they are not to receive paint, they shall be polished bronze unless otherwise indicated where they are to receive paint or other finishes. They may, at the Contractor's option, be Perma-Coated steel, prepared to receive finish.
- 2.2.9 Cleanouts and access panels shall be sized so as to permit the entry of a full sized rodding head capable of one hundred percent circumferential coverage of the line served.
- 2.2.10 Provide a non-hardening mixture of graphite and grease on threads of all screwed cleanouts during installation.
- 2.2.11 Do not install cleanouts against walls, partitions, etc. where rodding will be difficult or impossible. Extend past the obstruction.
- 2.2.12 In finished walls, floors, etc., insure that cleanouts are installed flush with finished surfaces and, where required, grout or otherwise finish in a neat and workmanlike manner.
- 2.2.13 Cleanouts shall be as manufactured by Zurn, Josam, Wade, Ancon, Jay R. Smith, similar to the following:
 - 2.2.13.1 Zurn, Z-1440 cleanouts or Z-1445 cleanout tee at base of exposed stack and at change in direction of exposed lines.
 - 2.2.13.2 Zurn, Z-1440 cleanout or Z-1445-1 cleanout tee where stacks are concealed in finished walls.
 - 2.2.13.3 Zurn, ZN-1400-T cleanout with square scoriated top in finished concrete and masonry tile floors.
 - 2.2.13.4 Zurn, ZN-1400-Tx cleanout with square recessed top for tile in vinyl and linoleum finished floors.
 - 2.2.13.5 Zurn, ZN-1400-Z cleanout with round recessed top for terrazzo floors.

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- 2.2.13.6 Zurn, Z-1400-HD cleanout with tractor cover for exterior locations. Provide concrete supporting pad crowned to shed water. Refer to drawings for pad size.
- 2.2.13.7 Mueller, No. D-731 or D-714, Nibco, Flage or equivalent for cleanouts in copper waste with cover plates and/or access panels listed for other cleanouts.
- 2.2.13.8 Threaded hex head type cleanouts of same materials as pipe for piping 2" and smaller.
- 2.2.13.9 Zurn, cleanout with round top with adjustable retainer for carpet area. Install flush with carpet.
- 2.3 Floor Drains: Provide floor drains at locations indicated and/or as required by State Plumbing/Building Codes. Install in a neat and workmanlike manner. Coordinate locations with appropriate persons or party to insure floor pitch to drain where required.
 - 2.3.1 Install floor drains in strict accordance with manufacturer's recommendations and the State Plumbing and Building Codes unless otherwise indicated.
 - 2.3.2 Each floor drain located on floors above the lowest floor shall be provided complete with a three (3) foot by three (3) foot, four (4) pound sheet lead flashing and clamping collar or chlorinated polyethylene shower pan liner of 30 mil. Lead pans shall be given a heavy coat of asphaltum on bottom and sides before installation and a heavy coat on exposed surfaces (if any). After installation, provide one ply of fifteen (15) pound roofing felt beneath each pan.
 - 2.3.3 Insure by coordination with the appropriate persons or party that spaces served by a floor drain(s) has a water seal extending at least three (3) inches from the floor of the space served on all floors above the lowest level.
 - 2.3.4 The floor drains shall be Zurn, Josam, Wade, Watts Drainage, Ancon or equivalent, similar to the following:
 - 2.3.5 FD-1 - Zurn, ZS415BS-P-VP floor drain with 6"dia. type "BS" vandal-proof secured stainless steel strainer, dura-coated cast iron body with bottom 3" outlet. Furnish and install 3" Sure Seal Model SS3000 preassembled Inline Floor Drain Trap Sealer. Commercial grade ABS plastic housing and neoprene rubber diaphragm with 2 soft rubber sealing gaskets. Floor rating ASSE – 1072 AF-GW.
 - 2.3.6 FD-2 - Zurn, ZN-511 floor drain with 9"dia. nickel bronze strainer, dura-coated cast iron deep sump with 4" bottom outlet, seepage pan and sediment bucket. Furnish and install 4" Sure Seal Model SS4009 preassembled Inline Floor Drain Trap Sealer. Commercial grade ABS plastic housing and neoprene rubber diaphragm with 1 soft rubber sealing gasket. Floor rating ASSE – 1072 AF-GW.
- 2.4 Cleanouts (Exterior) (CO): Provide exterior cleanouts at each location indicated and in the manner indicated. Permanently locate all exterior cleanouts with four (4) by four (4) inch solid concrete marker flush with grade labeled "CO". Exterior cleanouts shall be of the type indicated.

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- 2.5 Water Supply Specialties: Provide all water supply specialties indicated, specified and/or required for the complete installation. Install in a neat and workmanlike manner in accordance with the manufacturer's recommendations and the KBC.
- 2.5.1 Where required by the State Plumbing Code, install code approved vacuum breakers in each water supply specialty.
- 2.6 Freezeproof Wall Hydrants: Provide code approved wall hydrants at each location indicated in a neat and workmanlike manner. Affix tight to walls and insure that the feed piping is on the heated side of the building insulation blanket.
- 2.6.1 Where hydrants have key operators, turn over at least two (2) keys in an envelope labeled "Wall Hydrants" to owners upon completion of the project.
- 2.6.2 Where hydrants have lockable boxes, turn over at least two (2) keys in an envelope labeled "Wall Hydrants, Exterior" to owners upon completion of project.
- 2.6.3 Mount all wall hydrants at least twenty (20) inches above finished exterior grade. Where this is not possible or practical, contact Engineers.
- 2.6.4 Wall hydrants shall be as follows or equivalent:
- 2.6.4.1 Zurn 1300-SS or equivalent, 3/4", with half-turn ceramic cartridge, encased, flush, non-freeze, anti-siphon, automatic draining wall hydrant with key lock and combination backflow preventer/vacuum breaker. Provide stainless steel box and cover.
- 2.6.4.2 Hose Bibbs (HB): Provide code approved hose bibbs with vacuum breakers and male threaded spouts at each location indicated and as follows:
- 2.6.4.3 Do not install hose bibbs in spaces which do not have existing planned or installed floor drains even if sill cocks are indicated for these areas.
- 2.6.4.4 Hose bibbs shall be mounted at eighteen (18) inches minimum above finished floor served.
- 2.6.4.5 The hose bibbs shall be Woodford or equivalent similar to the following:
- 2.6.4.6 HB-Woodford Model 24 with loose key handle polished chrome finish, brass construction.
- 2.7 Water Hammer Arrestors (WHA): Provide water hammer arrestors at each location indicated and/or as required to eliminate hydrostatic on the domestic water system. Provide at least one water hammer arrestor at all quick acting valve locations including:
- Automatic clothes washers – Type "A"
 - Commercial Dishwashers – Type "B"
 - Sterilizers – Type "B"
 - Mop Basins (downstream of check valve)– Type "A"

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Flush valve fixtures – Type “B” (Each toilet room with 1-3 flush valve fixtures shall have its own Type “B” water hammer arrestor)

- 2.7.1 Multiple Fixtures – Branch Line Less Than 20’ Long: The preferred location for a Zurn Shoktrol is at the end of the branch line between the last two fixtures served when the branch lines do not exceed 20’ in length, from the start of the horizontal branch line to the last fixture supply on this line.
- 2.7.2 Multiple Fixtures – Branch Line More Than 20’ Long: On branch lines over 20’ in length, use two Shoktrols whose capacities total the requirement of the branch. Locate one unit between the last and next to last fixture and the other unit approximately midway between the fixtures.
- 2.7.3 Water hammer arrestors shall be Zurn, Z-1700, Shoktrol, Smith, Josam, Wade or equivalent. Water hammer arrestors shall be stainless steel, bellows type. Field fabricated capped cylinders shall not be acceptable.
- 2.7.4 Note: Provide insulating unions where arrestors are of dissimilar material from the piping served (unless piping is non-conducting, such as ABS or PVC).
- 2.7.5 Schedule:

| MARK | MANUFACTURER & MODEL | SIZE (FIXTURE UNITS) | P.D.I. SIZE |
|----------|----------------------|----------------------|-------------|
| TYPE "A" | ZURN, Z-1700 #100 | 1-11 | A |
| TYPE "B" | ZURN, Z-1700 #200 | 12-32 | B |
| TYPE "C" | ZURN, Z-1700 #300 | 33-60 | C |
| TYPE "D" | ZURN, Z-1700 #400 | 61-113 | D |

PART 3 - GENERAL SPECIALTIES:

- 3.1 Vacuum Breakers and Back Flow Preventers: Where required by the KBC, whether indicated or not, provide approved vacuum breakers or backflow preventers at the following locations.
- 3.2 Where domestic water system connects to fire protection system.
- 3.3 Where domestic water system connects to hydronic system.
- 3.4 At any hose (threaded) tap on the domestic water system.
- 3.5 Roof Flashings: All plumbing vents or other plumbing passing thru the roof shall be flashed as approved by the State Plumbing and Building Codes and as recommended by the roofing manufacturer and/or Contractor.

END OF SECTION.

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DIVISION 22 - PLUMBING

SECTION 220200 - PLUMBING FIXTURES, FITTINGS AND TRIM

PART 1 – GENERAL:

- 1.1 The Contractor's attention is directed to the General and Special Conditions, General Conditions-Mechanical and to all other Contract Documents as they apply to this branch of the work. Attention is also directed to all other sections of the Contract Documents which affect the work of this section and which are hereby made a part of the work specified in this section.
- 1.2 The Contractor shall provide all fixtures complete with trim required and connect in a manner conforming to the Kentucky Plumbing Code.
- 1.3 The Contractor shall obtain exact centerline rough-in dimensions between partitions, walls, etc. as required for lay-out of his rough-in work. All work shall be roughed-in so that all exposed piping will be straight and true without bends or offsets.
- 1.4 Water supplies shall connect through walls with stops and chrome plated escutcheons with set screws. In general, furnish the following with manual loose key stop valves:
 - 1.4.1 Drinking Fountains
 - 1.4.2 Wall-hung Lavatories
 - 1.4.3 Hose Bibbs

For all other fixtures, furnish with manual permanent-key stop valves (i.e. sinks in casework, etc.). When in doubt, contact Engineer prior to installation.
- 1.5 Water supplies shall connect through walls with stops and chrome plated escutcheons with set screws.
- 1.6 All exposed piping, stops, traps, tailpieces, etc. shall be code approved chrome plated brass unless otherwise indicated or specified.
- 1.7 All fittings, fixtures and trim shall be new unless otherwise indicated or specified. They shall also be of equivalent quality, dimensions, material, etc. as those specified.
- 1.8 Handicapped fixtures shall be mounted as recommended by the KBC and ADA.
- 1.9 All fixtures shall be mounted as recommended by the manufacturer unless otherwise indicated or specified and so as to be rigid to walls and floors. Pay particular attention to flush valves and bracket concealed portion to building structure during rough-in. Loose, shaky flush valves, lavatories, etc. shall not be acceptable.
- 1.10 Prior to final inspection open all faucets and allow to run for fifteen (15) minutes, then remove all faucet aerators and thoroughly clean until smooth flow is obtained.

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- 1.11 Prior to final inspection, test by operation at least twice:
 - 1.11.1 (Where applicable) adequate flow of hot and/or cold water at;
 - 1.11.1.1 All Faucets
 - 1.11.1.2 Flush Valves
 - 1.11.1.3 Hose Bibbs
 - 1.11.1.4 Sill Cocks
 - 1.11.1.5 All Other Valved Hot and/or Cold Water Openings In the Plumbing System
 - 1.12 Prior to final inspection, remove all stick-on labels, dirt, grease, other removable stampings, lettering, etc. from plumbing fixtures and thoroughly clean same.
 - 1.13 All fixtures shall be set level and true and shall be grouted into finished walls, floors, etc. in a neat and workmanlike manner with an approved waterproof non-yellowing grout for such service.
 - 1.14 Special Note for Handicap Grab Rails: Coordinate top of shower valves, flush valves, flush tank, etc., with location of grab rails as shown on the architectural plans. The Contractor shall install all items to allow for installation, removal and service without removal of the grab bar.
 - 1.15 Available Manufacturers: Subject to compliance with requirement's manufacturers offering plumbing fixtures and trim which may be incorporated in the work include the following:
 - 1.15.1 Plumbing Fixtures - Water Closet, Lavatory, Urinal, Bathtubs, Clinical Sink and Scrub Sink
 - 1.15.1.1 American Standard, U.S. Plumbing Products
 - 1.15.1.2 Briggs
 - 1.15.1.3 Crane Plumbing
 - 1.15.1.4 Sloan
 - 1.15.1.5 Kohler Co.
 - 1.15.1.6 Universal-Rundle
 - 1.15.1.7 Zurn
 - 1.15.2 Plumbing Trim
 - 1.15.2.1 American Standard, U.S. Plumbing Products
 - 1.15.2.2 Chicago Faucet Co.
 - 1.15.2.3 Kohler Co.
 - 1.15.2.4 Delta Commercial
 - 1.15.2.5 T&S Brass & Bronze Work Co.
 - 1.15.2.6 Just Co.
 - 1.15.2.7 Speakman Co.
 - 1.15.2.8 Zurn Aqua-Spec
 - 1.15.2.9 Moen Commercial

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1.15.3 Flush Valves

1.15.3.1 Sloan Valve Co.

1.15.3.2 Zurn Co.

1.15.4 Fixture Seats

1.15.4.1 Bemis Mfg. Co.

1.15.4.2 Church Seat Co.

1.15.4.3 Olsonite Corp., Olsonite Seats

1.15.5 Fixture Carriers

1.15.5.1 Josam Mfg. Co.

1.15.5.2 Kohler Co.

1.15.5.3 Tyler Pipe

1.15.5.4 Zurn Industries

1.15.5.5 Wade

1.15.5.6 Watts

1.15.6 Water Coolers

1.15.6.1 Acorn Aqual

1.15.6.2 Haws Drinking Faucet Co.

1.15.6.3 Murdock

PART 2 – SELECTION:

P-1 Water Closet – Wall Hung – ADA

Zurn model Z5617-BWL vitreous china, elongated rim, siphon action water closet with 1½" back spud, solid plastic elongated seat with open front, extended back, and check hinge. Provide with concealed "thin wall" carrier equal to Watts ISCA-151-L/R. Mount seat at 18" AFF. Concealed water closet flush valve shall be as follows:

- Flush valve shall be Zurn model Z6152-WS1-L3 concealed 1.6 GPF flushometer with 3" metal push button.

P-2 Lavatory – Handicap

Zurn model Z5364-PED vitreous china 20" x 18" lavatory with half pedestal, backsplash, rectangular basin, splash lip, and front overflow. Provide with concealed arm support and wall carrier. Provide lavatory drain with integral perforated strainer, 3/8" angle rigid supplies with stops and P-trap. Supply lines and P-trap shall be concealed within half pedestal. Mounting height to be per ADA. Lavatory trim shall be as follows:

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- Zurn Z86500-CS-3M, Deck mounted, 4-1/4" spout, 0.5 gpm vandal resistant spray outlet, metering valve and handles, metering cartridge and chrome polish finish. Provide with Powers 480 thermostatic mixing valve.

P-3 Drinking Fountain – ADA - Exterior

Murdock model GRM45-JF2 barrier free, bi-level, pedestal mounted drinking fountain with jug filler. Fountain shall have 18 gage, type 304 stainless steel bowls, powder coated 11 gage, heavy duty galvanized welded steel pedestal, front mounted self-closing activation buttons, polished chrome non-squirt bubblers, and vandal resistant access door. Color shall be black (custom color).

END OF SECTION.

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DIVISION 23 - HVAC

SECTION 230200 - HVAC EQUIPMENT

PART 1 – GENERAL:

- 1.1 The Contractor's attention is directed to the General and Special Conditions, General Conditions-Mechanical and to all other Contract Documents as they apply to this branch of the work. Attention is also directed to all other sections of the Contract Documents which affect the work of this section and which are hereby made a part of the work specified herein.
- 1.2 The Contractor shall provide in complete working order the following heating, ventilation and air conditioning equipment located as indicated and installed, connected and placed in operation in strict accordance with the manufacturer's recommendations. All equipment shall be factory painted and, where applicable, factory insulated and shall, where such standards exist, bear the label of the Underwriters Laboratory.
- 1.3 Each subcontractor shall be responsible for their own completion of System Verification Checklists/Manufacturer's Checklists.
- 1.4 Factory startup is required for all HVAC equipment. In general, as part of the verification process, equipment suppliers shall perform start-up by their factory authorized technicians and shall complete and submit start-up reports/checklists. This shall include air handling units, boilers, chillers, cooling towers, VFDs, etc.
- 1.5 All HVAC equipment shall comply with the latest provisions of ASHRAE Standard 90 and all provisions of the International Energy Conservation Code.
- 1.6 Note to Suppliers and Manufacturers Representative furnishing proposals for equipment for the project:
 - 1.6.1 Review the Controls Section of these Specifications (if applicable) to determine controls to be furnished by the equipment manufacturer, if any.
 - 1.6.2 All equipment shall be furnished for a single point electrical connection unless specifically excluded as a requirement.
 - 1.6.3 Review the section of these specifications entitle: REQUIRED SHOP DRAWINGS, DESCRIPTIVE LITERATURE, MAINTENANCE MANUALS, PARTS LISTS, SPECIAL KEYS, TOOLS, ETC., and provide all documents called for therein.
 - 1.6.4 Ensure that the equipment which you propose to furnish may be installed, connected, placed in operation and easily maintained at the location and in the space allocated for it.
 - 1.6.5 Review all documents as indicated in Paragraph "1.1" preceding.

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- 1.6.6 Determine from the Bid Documents the date of completion of this project and insure that equipment delivery schedules can be met so as to allow this completion date to be met.
- 1.6.7 Review the Section on Motor Starters and Electrical Requirements for Mechanical Equipment.
- 1.6.8 Where manufacturer's temperature controls are specified, they shall be in full compliance with NFPA 90-A including automatic smoke shut down provisions.
- 1.6.9 For all belt driven equipment, provide final fan and motor sheaves as determined by the air balance contractor during project balancing phase. The mechanical contractor shall install any new sheaves and belt as required for balancing.

PART 2 – EXHAUST FAN:

- 2.1 Description: Fan shall be inline mounted, direct driven, centrifugal exhaust fan.
- 2.2 Certifications: Fan shall be manufactured at an ISO 9001 certified facility. Fan shall be listed by Underwriters Laboratories (UL 705) and UL listed for Canada (cUL 705). Fan shall bear the AMCA Certified Ratings Seal for Sound and Air Performance.
- 2.3 Construction: The fan housing shall be minimum 20 gauge galvanized steel and acoustically insulated. Blower and motor assembly shall be mounted to a minimum 14 gauge reinforcing channel and shall be easily removable from the housing. Motor shall be mounted vibration isolators. Unit shall be supplied with integral wiring box and disconnect receptacle shall be standard. Discharge position shall be convertible from right angle to straight through by moving interchangeable panels. The outlet duct collar shall include a reinforced aluminum damper with continuous aluminum hinge rod and brass bushings.
- 2.4 Wheel: Wheel shall be centrifugal forward curved type, constructed of galvanized steel. Wheel shall be balanced in accordance with AMCA Standard 204-96, Balance Quality and Vibration Levels for Fans.
- 2.5 Motor: Motor shall be open drip proof type with permanently lubricated bearings, built-in thermal overload protection and disconnect plug. Motor shall be furnished at the specified voltage.
- 2.6 Acceptable Manufacturers: Loren Cook, Greenheck and Twin City.

PART 3 – UNIT HEATER:

- 3.1 Construction: Heavy 18 gauge welded steel cabinet with powder coated finish and control compartment housing a master terminal board with a hinged and latched access door, simplifying wiring, installation and maintenance. Provide wall bracket.
- 3.2 Heating Element: Copper clad steel sheath element with continuously brazed steel fins formed to allow side draw through air flow.

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- 3.3 Overheat Protection: Provide automatic reset type limit controls to de-energize the heater should an over-temperature situation occur.
- 3.4 Fan and Motor: Totally enclosed, 1-speed, 1-phase, permanently lubricated, thermally protected motors with unit bearings on 3 KW – 20 KW models. Totally enclosed, 2-speed, 1-phase, permanently lubricated, thermally protected motors with sleeve bearings on 25 KW – 50 KW models. All motors mounted with rubber insulators to minimize vibrations & noise. Fan over-ride purges unit of residual heat at shutdown.
- 3.5 Louver Assembly: Provide louvers adjustable for directional control of air flow up to 15° from straight horizontal.
- 3.6 Temperature Controls: Provide low voltage wall mounted thermostat with transformer with an adjustable temperature range of 40° to 90°F (60°F setpoint). Provide power disconnect switch.
- 3.7 Acceptable Manufacturers: Markel, Reznor, Modine.

END OF SECTION.

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DIVISION 23 - HVAC

SECTION 231100 - REGISTERS, GRILLES, DIFFUSERS & LOUVERS

PART 1 - REGISTERS, GRILLES AND DIFFUSERS:

1.1 GENERAL

1.1.1 Alternate R, G & D selections, other than manufacturers and models listed below, will be accepted, provided quality, function and characteristics are equivalent. Acceptable alternates are Metalaire, Anemostat, Price, Titus, Carnes, Nailor Industries and Tuttle & Bailey. Shop drawings shall identify and list all characteristics of each device exactly as scheduled herein. Finishes shall be selected by the Architect. If Architect elects not to select color, all colors shall be white. Factory color samples shall be submitted with shop drawings.

1.1.2 Include with the shop drawings a room-by-room schedule indicating devices installed. Also note ceiling types and installations.

PART 2 – SELECTION:

2.1 Refer to drawings for schedule.

END OF SECTION.

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DIVISION 23 - HVAC

SECTION 231200 - SHEET METAL

PART 1 – GENERAL:

- 1.1 The Contractor's attention is directed to the General and Special Conditions, General Requirements-Mechanical and to all other Contract Documents as they apply to this branch of the work. Attention is also directed to all other sections of the Contract Documents which affect the work of this section and which are hereby made a part of the work specified herein.
- 1.2 This branch of the work includes all materials, labor and accessories for the fabrication and installation of all sheet metal work as shown on the drawings and/or as specified herein. Where construction methods for various items are not indicated on the drawings or specified herein, all such work shall be fabricated and installed in accordance with the recommended methods outlined in the latest edition of SMACNA's Duct Manual and Sheet Metal Construction for Low Velocity Ventilating and Air Conditioning Systems. These references and plate numbers shall be used by the Engineer for required sheet metal thicknesses and final acceptance of methods of fabrication, hanging, accessories, etc. All equipment furnished by manufacturers shall be installed in strict accord with their recommended methods.
- 1.3 All ductwork stored on site shall be maintained dry and clean. All stored ductwork shall be covered and ends shall be capped. After duct is installed open ends shall be capped with plastic. It is the responsibility of the Contractor to maintain a clean duct system. If system is soiled this Contractor shall be responsible for having ductwork cleaned by a NADCA Certified Contractor.
- 1.4 Ductwork and piping shall be kept clean at all times. Ductwork stored on the job site shall be placed a minimum of 4" above the floor and shall be completely covered in plastic. Installed ductwork shall be protected with plastic. Do not install the ductwork if the building is not "dried-in". If this is required, the entire lengths of duct shall be covered in plastic to protect. The Owner/Engineer shall periodically inspect that these procedures are followed. If deemed unacceptable, the Contractor shall be required to clean the duct system utilizing a NADCA certified Contractor.
- 1.5 Prior to purchase and fabrication of ductwork (shop fabricated or manufactured), the Contractor shall coordinate installations with new and existing conditions. Notify the Engineer if there are any discrepancies for resolution.

PART 2 - LOW VELOCITY DUCTWORK:

2.1 GENERAL (LOW VELOCITY)

- 2.1.1 Double turning vanes shall be installed in square turns and/or where indicated.
- 2.1.2 Provide a "high efficiency" type take-off with round damper (Flexmaster CB-D-B03 or approved equal) for all round duct branches from a rectangular main to a GRD. Refer to the detail on the drawings for all installation requirements.

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- 2.1.3 Cross-break all ducts where either cross sectional dimension is 18" or larger.
- 2.1.4 Air volume dampers shall be installed in each duct branch takeoffs and/or where indicated, whichever is more stringent. All such dampers shall be accessible without damage to finishes or insulation and shall be provided where required for proper system balance.
- 2.1.5 Unless otherwise dimensioned on the drawings, all diffusers, registers and grilles shall be located aesthetically and symmetrically with respect to lighting, ceiling patterns, doors, masonry bond, etc.
- 2.1.6 The interior surface of the ductwork connecting to return/exhaust air grilles shall be painted flat black. The ductwork shall be painted a minimum of 24" starting from the grille.
- 2.1.7 Ducts shall be hung by angles, rods, 18 ga. minimum straps, trapezes, etc., in accordance with SMACNA's recommended practices. There shall be no less than one set of hangers for each section of ductwork. Where ductwork contains filter sections, coils, fans or other equipment or items, such equipment or items shall be hung independently of ductwork with rods or angles. Do not suspend ducts from perlin or other weak structural members where no additional weight may be applied. If in doubt, consult the structural engineer.
- 2.1.8 Provide approved flexible connectors at inlet and outlet of each item of heating and cooling equipment whether indicated or not. Install so as to facilitate removal of equipment as well as for vibration and noise control.
- 2.1.9 All ductwork connections, fittings, joints, etc., shall be sealed. Seal with hardcast "Irongrip 601". Apply per manufacturer's recommendations.
- 2.1.10 Duct dimensions indicated are required inside clear dimensions. Plan duct layouts for adequate insulation and fitting clearance.
- 2.1.11 All angular turns shall be made with the radius of the center line of the duct equivalent to 1.5 times the width of the duct.
- 2.1.12 Miscellaneous accessories such as test openings with covers, latches, hardware, locking devices, etc., shall be installed as recommended by SMACNA and/or as indicated. Test openings shall be placed at the inlet and discharge of all centrifugal fans, VAV boxes, fan sections of air handling units, at the end and middle of all main trunk ducts and where indicated. All such openings shall be readily accessible without damage to finishes.
- 2.1.13 Whether indicated or not, provide code approved, full sized fire dampers at all locations where ductwork penetrates fire rated walls. Fire stop rating shall meet or exceed the rating of the wall. Provide an approved access panel at each fire damper located and sized so as to allow hand reset of each fire dampers. All such fire dampers and access panels shall be readily accessible without damage to finishes. Refer to Architectural Plans for locations of fire rated walls. All access doors shall be 16"x16" or as high as ductwork permits and 16" in length.

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- 2.1.14 The Contractor who installs the sheet metal shall furnish to the Air Balancing Contractor, a qualified person to assist in testing and balancing the system.
- 2.1.15 Locate all supply, return and exhaust diffusers and grilles in the locations shown on the architectural reflected ceiling plan.
- 2.1.16 All fans and other vibrating equipment shall be suspended by independent vibration isolators.

2.2 MATERIALS (LOW VELOCITY)

- 2.2.1 Ductwork, plenums and other appurtenances shall be constructed of one of the following: (Except MRI Scan Rooms – only use aluminum in the MRI Scan Rooms)
 - 2.2.1.1 Steel sheets, zinc coated, Federal Specification 00-S-775, Type I, Class E & ASTM A93-59T with G-90 zinc coating.
 - 2.2.2 Ductwork, plenums and other appurtenances shall be constructed of the materials of the minimum weights or gauges as required by the latest SMACNA 2" W.G. Standard or below table. When gauge thickness differs, the heavier gauge shall be selected. The below table shall serve as a minimum.

| <u>Round Diameter</u> | <u>Duct Gauge</u> | <u>Rectangular Width</u> | <u>Duct Gauge</u> |
|-----------------------|-------------------|--------------------------|-------------------|
| 3-12 Inches | 26 Ga. | 3-12 inches | 26 Ga. |
| 12-18 Inches | 24 Ga. | 13-30 inches | 24 Ga. |
| 19-28 Inches | 22 Ga. | 31-54 inches | 22 Ga. |
| 29-36 Inches | 20 Ga. | 55-84 inches | 20 Ga. |
| 37-52 Inches | 18 Ga. | 85 inches and up | 18 Ga. |

2.3 MISCELLANEOUS (LOW VELOCITY)

- 2.3.1 Flexible Connectors: Duro-Dyne, Ventfabrics, Inc., U.S. Rubber or equivalent; conforming to NFPA No. 90A; neoprene coated glass fabric; 20 oz. for low velocity ducts secured with snap lock.
- 2.3.2 Turning Vanes: Fabricated as recommended by SMACNA: noiseless when in place without mounting projections in ducts. All turning vanes shall be double blade type.
- 2.3.3 Volume Dampers (Rectangular): Leader MO3 or Empco, Air Balance, Louvers and Dampers, Cesco, Ruskin, Pottorff rectangular volume dampers. Frames shall be 18 gauge galvanized steel. Blades shall be opposed blade 18 gauge galvanized steel with triple crimped blades on 6" centers. Linkage shall be concealed in jamb. Bearings shall be 1/2" nylon. Maximum single section size shall be 48" wide and 72" high. Provide with Ventfabrics 1" high elevated dial regulator to avoid damper handle from conflicting with duct insulation. Provide permanent mark on dial regulator to mark air balance point.
- 2.3.4 Volume Dampers (Round): Leader BR-4 or Empco, Air Balance, Louvers and Dampers, Cesco, Ruskin, Pottorff round volume dampers. Dampers shall be butterfly type consisting of circular

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blade mounted to axle. Frames shall be 22 gauge steel and 5" long. Damper blades shall be 20 gauge crimped galvanized steel. Axle shall be 3/8"x5" square plated steel. Bearing shall be 3/8" nylon. Provide with Ventfabrics 1" high elevated dial regulator to avoid damper handle from conflicting with duct insulation. Provide permanent mark on dial regulator to mark air balance point.

END OF SECTION.

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DIVISION 26 - ELECTRICAL

SECTION 260501 - GENERAL PROVISIONS - ELECTRICAL

PART 1 - GENERAL

- 1.1 The Instructions to Bidders, General and Special Conditions, and all other contract documents shall apply to the Contractor's work as well as to each of his Sub Contractor's work. Each Contractor is directed to familiarize himself in detail with all documents pertinent to this Contract. In case of conflict between these General Provisions and the General and/or Special Conditions, the affected Contractor shall contact the Engineer for clarification and final determination.
- 1.2 Each Contractor shall be governed by any alternates, unit prices and Addenda or other contract documents insofar as they may affect his part of the work.
- 1.3 The work included in this division consists of the furnishing of all labor, equipment, transportation, supplies, material and appurtenances and performing all operations necessary for the satisfactory installation of complete and operating Electrical Systems indicated on the drawings and/or specified herein.
- 1.4 Any materials, labor, equipment or services not mentioned specifically herein which may be necessary to complete or perfect any part of the Electrical Systems in a substantial manner, in compliance with the requirements stated, implied, or intended in the drawings and specifications, shall be included as part of this Contract. The Contractor shall give written notice of any materials or apparatus believed inadequate or unsuitable; in violation of laws, ordinances, rules or regulations of authorities having jurisdiction; and any necessary items of work omitted a minimum of ten days prior to bid. In the absence of such written notice and by the act of submitting his bid, it shall be understood that the Contractor has included the cost of all required items in his bid, and that he will be responsible for the approved satisfactory functioning of the entire system without extra compensations.
- 1.5 It is not the intent of this section of the specifications (or the remainder of the contract documents) to make any specific Contractor, other than the Contractor holding the prime contract, responsible to the Owner, Architect and Engineer. All transactions such as submittal of shop drawings, claims for extra costs, requests for equipment or materials substitution, shall be done through the Contractor to the Architect (if applicable), then to the Engineer.
- 1.6 This section of the Specifications or the arrangement of the contract documents shall not be construed as an attempt to arbitrarily assign responsibility for work, material, equipment or services to a particular trade Contractor or Sub-Contractor. Unless stated otherwise, the subdivision and assignment of work under the various sections shall be the responsibility of the Contractor holding the prime contract.
- 1.7 It is the intent of this Contract to deliver to the Owners a "like new" project once work is complete. Although plans and specifications are complete to the extent possible, it shall be responsibility of the Contractors involved to remove and/or relocate or re-attach any existing or new systems which interfere with new equipment or materials to be installed by other trades without additional cost to the Owner.

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- 1.8 In general, and to the extent possible, all work shall be accomplished without interruption of the existing facilities' operations. Each Contractor shall advise the Architect, Owner and Engineer in writing at least one week prior to the deliberate interruption of any services. The Owners shall be advised of the exact time that interruption will occur and the length of time the interruption will occur. Failure to comply with this requirement may result in complete work stoppage by the Contractors involved until a complete schedule of interruptions can be developed.
- 1.9 Whenever utilities are interrupted, either deliberately or accidentally, the Contractor shall work continuously to restore said service. The Contractor shall provide tools, materials, skilled journeymen of his own and other trades as necessary, premium time as needed and coordination with all applicable utilities, including payment of utility company charges (if any), all without requests for extra compensation to the Owner, except where otherwise provided for in the contract for the work.
- 1.10 Definitions:
- 1.10.1 Prime Contractor - The Contractor who has been engaged by the Owner in a contractual relationship to accomplish the work.
- 1.10.2 Electrical Contractor - Any Contractor whether bidding or working independently or under the supervision of a General Contractor, that is: the one holding the Prime Contract and who installs any type of Electrical work, such as: power, lighting, television, telecommunications, data, fiber optic, intercom, fire detection and alarm, security, video, underground or overhead electrical, etc.
- 1.10.3 Electrical Sub-Contractor - Each or any Contractor contracted to, or employed by, the Electrical Contractor for any work required by the Electrical Contractor.
- 1.10.4 Engineer - The Consulting Mechanical-Electrical Engineers either consulting to the Owner, Architect, other Engineers, etc.
- 1.10.5 Architect - The Architect of Record for the project, if any.
- 1.10.6 Furnish - Deliver to the site in good condition.
- 1.10.7 Provide - Furnish and install in complete working order.
- 1.10.8 Install - Install equipment furnished by others in complete working order.
- 1.10.9 Contract Documents - All documents pertinent to the quality and quantity of all work to be performed on the project. Includes, but not limited to: Plans, Specifications, Addenda, Instructions to Bidders, (both General and Sub-Contractors), Unit Prices, Shop Drawings, Field Orders, Change Orders, Cost Breakdowns, Construction Manager's Assignments, Architect's Supplemental Instructions, Periodical Payment Requests, etc.
- 1.10.9.1 Note: Any reference within these specifications to a specific entity, i.e., "Electrical Contractor" is not to be construed as an attempt to limit or define the scope of work for that entity or assign work to a specific trade or contracting entity. Such assignments of responsibility are the

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responsibility of the Contractor or Construction Manager holding the prime contract, unless otherwise provided herein.

PART 2 - INTENT

- 2.1 It is the intent of these specifications and all associated drawings that the Contractor provide finished work, tested, and ready for operation. Wherever the word "provide" is used, it shall mean "furnish and install complete and ready for use."
- 2.2 Minor details not usually shown or specified, but necessary for the proper installation and operation, shall be included in the work, the same as if herein specified or shown.

PART 3 - ELECTRICAL DRAWINGS AND SPECIFICATIONS

- 3.1 The drawings are diagrammatic only and indicate the general arrangement of the systems and are to be followed insofar as possible. If deviations from the layouts are necessitated by field conditions, detailed layouts of the proposed departures shall be submitted in writing to the Engineer for approval before proceeding with the work. The Contract Drawings are not intended to show every vertical or horizontal offset which may be necessary to complete the systems. Contractors shall, however, anticipate that additional offsets may be required and submit their bid accordingly.
- 3.2 The drawings and specifications are intended to supplement each other. No Contractor or supplier shall take advantage of conflict between them, or between parts of either, but should this condition exist, the Contractor or supplier shall request a clarification of the condition at least ten days prior to the submission of bids so that the condition may be clarified by Addendum. In the event that such a condition arises after work is started, the interpretation of the Engineer shall be the determining factor. In all instances, unless modified in writing and agreed upon by all parties thereto, the Contract to accomplish the work shall be binding on the affected Contractor.
- 3.3 The drawings and specifications shall be considered to be cooperative and complimentary and anything appearing in the specifications which may not be indicated on the drawings or conversely, shall be considered as part of the Contract and must be executed the same as though indicated by both.
- 3.4 This Contractor shall make all his own measurements in the field and shall be responsible for correct fitting. He shall coordinate this work with all other branches of work in such a manner as to cause a minimum of conflict or delay.
- 3.5 The Engineer shall reserve the right to make minor adjustments in location of conduit, fixtures, outlets, switches, etc., where he considers such adjustments desirable in the interest of concealing work or presenting a better appearance.
- 3.6 Each Contractor shall evaluate ceiling heights called for on Architectural Plans. Where the location of Electrical equipment may interfere with ceiling heights, the Contractor shall call this to the attention of the Engineer in writing prior to making the installation. Any such changes shall be anticipated and requested sufficiently in advance so as to not cause extra work on the part of the Contractor or unduly delay the work.

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- 3.7 Should overlap of work between the various trades become evident, this shall be called to the attention of the Engineer. In such event neither trade shall assume that he is to be relieved of the work which is specified under his branch until instructions in writing are received from the Engineer.
- 3.8 The Electrical drawings are intended to show the approximate location of equipment, materials, etc. Dimensions given in figures on the drawings shall take precedence over scaled dimensions and all dimensions whether given in figures or scaled shall be verified in the field. In case of conflict between small and large scale drawings, the larger scale drawings shall take precedence.
- 3.9 The Electrical Contractor and his Sub Contractors shall review all drawings in detail as they may relate to his work (structural, architectural, site survey, mechanical, etc.). Review all drawings for general coordination of work, responsibilities, ceiling clearances, wall penetration points, chase access, fixture elevations, etc. Make any pertinent coordination or apparent conflict comments to the Engineers at least ten days prior to bids, for issuance of clarification by written addendum.
- 3.10 Where on any of the drawings a portion of the work is drawn out and the remainder is indicated in outline, or not indicated at all, the parts drawn out shall apply to all other like portions of the work. Where ornament or other detail is indicated by starting only, such detail shall be continued throughout the courses or parts in which it occurs and shall also apply to all other similar parts of the work, unless otherwise indicated.
- 3.11 Special Note: Always check ceiling heights indicated on Drawings and Schedules and insure that these heights may be maintained after all mechanical and electrical equipment is installed. If a conflict is apparent, notify the Engineer in writing for instructions.

PART 4 - EXAMINATION OF SITE AND CONDITIONS

- 4.1 Each Contractor shall inform himself of all of the conditions under which the work is to be performed, the site of the work, the structure of the ground, the obstacles that may be encountered, the availability and location of necessary facilities and all relevant matters concerning the work. All Contractors shall carefully examine all Drawings and Specifications and inform themselves of the kind and type of materials to be used throughout the project and which may, in any way, affect the execution of his work.
- 4.2 Each Contractor shall fully acquaint himself with all existing conditions as to ingress and egress, distance of haul from supply points, routes for transportation of materials, facilities and services, availability of temporary or permanent utilities, etc. The Contractor shall include in his work all expenses or disbursements in connection with such matters and conditions. Each Contractor shall verify all work shown on the drawings and conditions at the site, and shall report in writing to the Engineer ten days prior to bid, any apparent omissions or discrepancies in order that clarifications may be issued by written addendum. No allowance is to be made for lack of knowledge concerning such conditions after bids are accepted.

PART 5 - EQUIPMENT AND MATERIALS SUBSTITUTIONS OR DEVIATIONS

- 5.1 When any Contractor requests review of substitute materials and/or equipment, and when under an approved formal alternate proposal, it shall be understood and agreed that such substitution, if approved, will be made without additional cost regardless of changes in connections, spacing,

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service, mounting, etc. In all cases where substitutions affect other trades, the Contractor offering such substitutions shall advise all such Contractors of the change and shall reimburse them for all necessary changes in their work. Any drawings, Specifications, Diagrams, etc., required to describe and coordinate such substitutions or deviations shall be professionally prepared at the responsible Contractor's expense. Special Note: Review of Shop Drawings by the Engineer does not absolve the Contractor of this responsibility.

- 5.2 References in the specifications to any article, device, product, material, fixture, form, or type of construction by name, make, or catalog number shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition. Each Contractor, in such cases, may, at his option, use any article, device, product, material, fixture, form, or type of construction which in the judgment of the Engineer is equivalent to that specified, provided the provisions of paragraph (A) immediately preceding are met. Substitutions shall be submitted to the Engineer a minimum of ten days prior to bid date for approval to bid in written form thru addenda or other method selected by the Engineer. If this procedure is not followed, the substitution will be rejected. If prevailing laws of cities, towns, states or countries are more stringent than these specifications regarding such substitutions, then those laws shall prevail over these requirements.
- 5.3 Wherever any equipment and material is specified exclusively only such items shall be used unless substitution is accepted in writing by the engineers.
- 5.4 Each Contractor shall furnish along with his proposal a list of specified equipment and materials which he proposes to provide. Where several makes are mentioned in the Specifications and the Contractor fails to state which he proposes to furnish, the Engineer shall have the right to choose any of the makes mentioned without change in price.

PART 6 - SUPERVISION OF WORK

- 6.1 Each Contractor and Sub-Contractors shall personally supervise the work or have a competent superintendent on the project site at all times during progress of the work, with full authority to act for him in matters related to the project.

PART 7 - CODES, RULES, PERMITS, FEES, REGULATIONS, ETC.

- 7.1 The Contractor shall give all necessary notices, obtain and pay for all permits, government sales taxes, fees, and other costs including utility connections or extensions, in connection with his work. As necessary, he shall file all required plans, utility easement requests and drawings, survey information on line locations, load calculations, etc., prepare all documents and obtain all necessary approvals of all utility and governmental departments having jurisdiction; obtain all required certificates of inspection for his work and deliver same to the Engineer before request for acceptance and final payment for the work.
- 7.2 Ignorance of Codes, Rules, regulations, utility company requirements, laws, etc., shall not diminish or absolve Contractor's responsibilities to provide and complete all work in compliance with such.
- 7.3 The Contractor shall include in the work, without extra cost to the Owner, any labor, materials, services, apparatus or drawings required in order to comply with all applicable laws, ordinances rules and regulations, whether or not shown on drawings and/or specified.

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- 7.4 All materials furnished and all work installed shall comply with the current edition of the National Electrical Codes, National Fire Codes of the National Fire Protection Association, the requirements of local utility companies, and with the requirements of all governmental agencies or departments having jurisdiction.
- 7.5 All material and equipment for the electrical systems shall bear the approval label, and shall be listed by the Underwriters' Laboratories, Incorporated. Listings by other testing agencies may be acceptable with written approval by the Engineer.
- 7.6 All electrical work is to be constructed and installed in accordance with plans and specifications which have been approved in their entirety and/or reflect any changes requested by the State Fire Marshal, as applicable or required. Electrical work shall not commence until such plans are in the hands of the Electrical Contractor.
- 7.7 The Contractor shall insure that his work is accomplished in accord with OSHA Standards and any other applicable government requirements.
- 7.8 Where conflict arises between any code and the plans and/or specifications, the code shall apply except in the instance where the plans and specifications exceed the requirements of the code. Any changes required as a result of these conflicts shall be brought to the attention of the Engineer at least ten working days prior to bid date, otherwise the Contractor shall make the required changes at his own expense. The provisions of the codes constitute minimum standards for wiring methods, materials, equipment and construction and compliance therewith will be required for all electrical work, except where the drawings and specifications require better materials, equipment, and construction than these minimum standards, in which case the drawings and specifications shall be the minimum standards.

PART 8 - COST BREAKDOWNS

- 8.1 Within thirty days after acceptance of the Contract, each Contractor is required to furnish to the Engineer one copy of a detailed cost breakdown on each respective area of work. These cost breakdowns shall be made on forms provided or approved by the Engineer or Architect. Payments will not be made until satisfactory cost breakdowns are submitted.

PART 9 - GUARANTEES AND WARRANTIES

- 9.1 Each Contractor shall reference General Conditions for warranties and corrections of work.
- 9.2 Items of equipment which have longer guarantees, as called for in these specifications or as otherwise offered by the manufacturer, such as generators, engines, batteries, transformers, etc., shall have warranties and guarantees completed in order, and shall be in effect at the time of final acceptance of the work by the Engineer. The Contractor shall present the Engineer with such warranties and guarantees at the time of final acceptance of the work. The Owner reserves the right to use equipment installed by the Contractor prior to date of final acceptance. Such use of equipment shall in no way invalidate the guarantee except that Owner shall be liable for any damage to equipment during this period due to negligence of his operator or other employee.

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PART 10 - INSPECTION, APPROVALS AND TESTS

- 10.1 Before requesting a final review of the installation from the Architect and/or Engineer, each Contractor shall thoroughly inspect his installation to assure that the work is complete in every detail and that all requirements of the Contract Documents have been fulfilled. Failure to accomplish this may result in charges from the Architect and/or Engineers for unnecessary and undue work on their part.
- 10.2 Owner's and Engineer's inspections: Two inspections will be held to generate and then review punchlist items. All site visits thereafter shall be billed to the Contractor at the Engineer's standard hourly rates.
- 10.3 The Contractor shall provide as a part of this contract electrical inspection by the City of Louisville Electrical Inspector, licensed to provide such services. All costs incidental to the provision of electrical inspections shall be borne by the Contractor.
- 10.4 The Contractor shall advise each Inspection Agency in writing (with an information copy of the correspondence to the Architect and/or Engineer) when he anticipates commencing work. Failure of the Inspection Agency to inspect the work in the stage following and submit the related reports may result in the Contractor's having to expose concealed work not so inspected. Such exposure will be at the expense of the responsible Contractor.
- 10.5 Inspections shall be scheduled for rough-in as well as finished work. The rough-in inspections shall be divided into as many inspections as may be necessary to cover all roughing-in without fail. Report of each such inspection visit shall be submitted to the Architect, Engineer and the Contractor within three days of the inspection.
- 10.6 Approval by an Inspector does not relieve the Contractor from the responsibilities of furnishing equipment having a quality of performance equivalent to the requirements set forth in these plans and specifications. All work under this contract is subject to the review of the Architect and/or Engineer, whose decision is binding.
- 10.7 Before final acceptance, the Contractor shall furnish the original and three copies of the certificates of final approval by the Electrical Inspector (as well as all other inspection certificates) to the Engineer with one copy of each to the appropriate government agencies, as applicable. Final payment for the work shall be contingent upon completion of this requirement.
- 10.8 The Contractor shall test all wiring and connections for continuity and grounds before equipment and fixtures are connected, and when indicated or required, demonstrate by Megger Test the insulation resistance of any circuit or group of circuits. Where such tests indicate the possibility of faulty insulation, locate the point of such fault, pull out the defective conductor, replacing same with new and demonstrate by further test the elimination of such defect.

PART 11 - CHANGES IN ELECTRICAL WORK

REFER TO GENERAL AND SPECIAL CONDITIONS.

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PART 12 - CLAIMS FOR EXTRA COST

REFER TO GENERAL AND SPECIAL CONDITIONS.

PART 13 - SURVEYS, MEASUREMENTS AND GRADES

- 13.1 The Contractor shall lay out his work and be responsible for all necessary lines, levels, elevations and measurements. He must verify the figures shown on the drawings before laying out the work and will be held responsible for any error resulting from his failure to do so.
- 13.2 The Contractor shall base all measurements, both horizontal and vertical from established benchmarks. All work shall agree with these established lines and levels. Verify all measurements at site and check the correctness of same as related to the work.
- 13.3 Should the Contractor discover any discrepancy between actual measurements and those indicated, which prevents following good practice or the intent of the drawings and specifications, he shall notify the Engineer thru normal channels of job communication and shall not proceed with his work until he has received instructions from the Engineer.

PART 14 - TEMPORARY USE OF EQUIPMENT

- 14.1 The permanent electrical equipment, when installed, may be used for temporary services, subject to an agreement between the Contractors involved, the Owner, and with the consent of the Engineer. Should the permanent systems be used for this purpose, each Contractor shall pay for all temporary connections required and any replacements required due to damage without cost, leaving the equipment and installation in "as new" condition.
- 14.2 Permission to use the permanent equipment does not relieve the Contractors who utilize this equipment from the responsibility for any damages to the building construction and/or equipment which might result because of its use.

PART 15 - TEMPORARY SERVICES

- 15.1 The Contractor shall arrange with the General Contractor or Construction Manager for temporary electrical and other services which he may require to accomplish his work. In the absence of other provisions in the contract, the Contractor shall provide for his own temporary services of all types, including the cost of connections, utility company fees, construction, removal, etc., in his bid.
- 15.2 All temporary services shall be removed by Contractor prior to acceptance of work.

PART 16 - RECORD DRAWINGS

- 16.1 Note: Also, refer to additional record drawing requirements within the general conditions and other sections of these specifications.
- 16.2 The Contractor shall insure that any deviations from the design are being recorded daily or as necessary on record drawings being maintained by the Contractor. Dimensions from fixed, visible

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permanent lines or landmarks shown in vertical and horizontal ways shall be utilized. Compliance shall be a requirement for final payment. Pay particular attention to the location of underfloor or underground exterior in-contract or utility-owned or leased service lines, main switches and other appurtenances important to the maintenance and safety of the Electrical System. Deliver these record drawings to the Engineer as a system is completed, within ten days of the mark-up and/or while the accuracy of the mark-ups can be verified visually. Monthly payment may be withheld if the requirement is not complied with.

PART 17 - MATERIALS AND WORKMANSHIP

- 17.1 All electrical equipment, materials and articles incorporated in the work shall be new and of comparable quality to that specified. All workmanship shall be first-class and shall be performed by electricians skilled and regularly employed in their respective trades. The Contractor shall determine that the equipment he proposes to furnish can be brought into the building(s) and installed within the space available. All equipment shall be installed so that all parts are readily accessible for inspection, maintenance, replacement, etc. Extra compensation will not be allowed for relocation of equipment for accessibility or for dismantling equipment to obtain entrance into the building(s).
- 17.2 All conduit and/or conductors shall be concealed underground, within crawl space in or below walls, floors or above ceilings unless otherwise noted. All fixtures, devices and wiring required shall be installed to make up complete systems as indicated on the drawings and specified herein. Raceways shall not be placed within foundation walls and footings. See notes on plans about the limitation on work allowed to be installed within the crawl space.
- 17.3 All materials, where applicable, shall bear Underwriters' Laboratories label or that of another Engineer-approved testing agency, where such a standard has been established.
- 17.4 Each length of conduit, wireway, duct, conductor, cable, fitting, fixture and device used in the electrical systems shall be stamped or indelibly marked with the makers mark or name.
- 17.5 All electrical equipment shall bear the manufacturer's name and address and shall indicate its electrical capacity and characteristics.
- 17.6 All electrical materials, equipment and appliances shall conform to the latest standards of the National Electric Manufacturers Association (NEMA) and the National Board of Fire Underwriters (NBFU) and shall be approved by the Owner's insuring agency if so required.

PART 18 - QUALIFICATIONS OF WORKMEN

- 18.1 All electrical contractors bidding this project must have been a licensed company for a minimum of three years to qualify to bid this project. Individual employee experience does not supercede this requirement.
- 18.2 All subcontractors bidding the electrical work must have completed one project of 70% this subcontract cost size and two projects of 50% this subcontract cost size.

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- 18.3 All electrical work shall be accomplished by qualified workmen competent in the area of work for which they are responsible. Untrained and incompetent workmen as evidenced by their workmanship shall be relieved of their responsibilities in those areas. The Engineer shall reserve the right to determine the quality of workmanship of any workman and unqualified or incompetent workmen shall refrain from work in areas not satisfactory to him. Requests for relief of a workman shall be made through the normal channels of responsibility established by the Architect or the contract document provisions.
- 18.4 All electrical work shall be accomplished by Journeymen electricians under the direct supervision of a licensed Electrician. All applicable codes, utility company regulations, laws and permitting authority of the locality shall be fully complied with by the Contractor.

PART 19 - CONDUCT OF WORKMEN

- 19.1 The Contractor shall be responsible for the conduct of all workmen under his supervision. Misconduct on the part of any workmen to the extent of creating a safety hazard, or endangering the lives and property of others, shall result in the prompt permanent dismissal of that workman from the project. The possession, consumption or influence of alcoholic beverages, narcotics or illegally used controlled substances on the jobsite is strictly forbidden. Possession of a fire-arm is prohibited and may result in prosecution. Foul or bad language, graffiti is strictly prohibited. Display of nude tattoos is prohibited.

PART 20 - COOPERATION AND COORDINATION BETWEEN TRADES

- 20.1 The Contractor is expressly directed to read the General Conditions and all detailed sections of these specifications for all other trades and to study all drawings applicable to his work, including Architectural, Mechanical and Structural Drawings, to the end that complete coordination between trades will be effected.
- 20.2 Refer to Coordination Among Trades, Systems Interfacing and Connection of Equipment Furnished by Others section of these Specifications for further coordination requirements. The Contractor is responsible for the correct location of all rough-in and connections at every piece of equipment. Work not correctly located shall be relocated at the Contractor's expense.

PART 21 - PROTECTION OF EQUIPMENT

- 21.1 The Contractor shall be entirely responsible for all material and equipment furnished by him in connection with his work and special care shall be taken to properly protect all parts thereof from damage and weather during the construction period. Such protection shall be by a means acceptable to the Engineer. All rough-in conduit shall be properly plugged or capped during construction in a manner approved by the Engineer. Equipment damaged while stored on site either before or after installation shall be repaired or replaced (as determined by the Engineer) by the responsible Contractor. Electrical equipment exposed to the weather shall be replaced by the Contractor at his expense.

PART 22 - CONCRETE WORK

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- 22.1 The Contractor shall be responsible for the provision of all concrete work required for the installation of any of his systems or equipment. If this work is provided by another trade, it will not relieve the Electrical Contractor of his responsibilities relative to dimensions, quality of workmanship, locations, etc. In the absence of other concrete specifications, all concrete related to Electrical work shall be 3000 PSI minimum compression strength at 28 days curing and shall conform to the standards of the American Concrete Institute Publication ACI-318. Heavy equipment shall not be set on pads for at least seven days after pour.
- 22.2 All concrete pads shall be complete with all pipe sleeves, embeds, anchor bolts, reinforcing steel, concrete, etc., as required. Pads larger than 18" in width shall be reinforced with minimum #4 round bars on 6" centers both ways. All reinforcing steel shall be per ASTM requirements, tied properly, lapped 18 bar diameters and supported appropriately up off form, slab or underlayment. Bars shall be approximately 3" above the bottom of the pad with a minimum 2" cover. All parts of pads and foundations shall be properly rodded or vibrated. If exposed parts of the pads and foundations are rough or show honeycomb after removing forms properly adhered repairs shall be made. If structural integrity is violated, the concrete shall be replaced. All surfaces shall be rubbed to a smooth finish and chamfered edges.
- 22.3 Special Note: All pads and concrete lighting standard bases shall be crowned slightly in center to avoid water ponding beneath equipment.
- 22.4 In general, concrete pads for small equipment shall extend 6" beyond the equipment's base dimensions. For large equipment with service access panels, extend pads 18" beyond base or overall dimensions to allow walking and servicing space at locations requiring service access.
- 22.5 Exterior concrete pads shall be 4" minimum above grade and 4" below grade on a tamped 4" dense grade rock base unless otherwise noted or required by utility company. Surfaces of all foundations and bases shall have a smooth finish with three-quarter inch radius or chamfer on exposed edges, trowelled or rubbed smooth. All exterior pads shall be crowned approximately 1/8" per foot, sloping from center for drainage.

PART 23 - RESTORATION OF NEW OR EXISTING SHRUBS, PAVING, ETC.

- 23.1 The Contractor shall replace to their original condition all paving, curbing surfaces, drainage ditches, structures, fences, shrubs, existing or new building surfaces and appurtenances, and any other items damaged or removed by his operations. Replacement and repairs shall be in accordance with good construction practice and shall match materials employed in the original construction of the item to be replaced. All repairs shall be to the satisfaction of the Engineer, and in accord with the Architect's standards for such work, as applicable. Patchwork on new construction will not be accepted.

PART 24 - MAINTENANCE OF EXISTING UTILITIES AND LINES

- 24.1 The locations of all piping, conduits, cables, utilities and manholes existing, or otherwise, that come within the contract construction site, shall be subject to continuous uninterrupted maintenance with no exception unless the Owner of the utilities grants permission to interrupt same temporarily, if need be. Provide one week's written notice to Engineer, Architect and Owner prior to interrupting any utility service or line. Also see Article 1. - General, this section.

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- 24.2 Known utilities and lines as available to the Engineer are shown on the drawings. However, it is additionally required that, prior to any excavation being performed, each Contractor ascertain and mark all utilities or lines that would be endangered by the excavation. Contractor shall bear costs of repairing damaged utilities.
- 24.3 If the above mentioned utilities or lines occur in the earth within the construction site, the Contractor shall first probe and make every effort to locate the lines prior to excavating in the respective area.
- 24.4 Cutting into existing utilities and services shall be done in coordination with and as designated by the Owner of the utility. The Contractor shall work continuously to restore service(s) upon deliberate or accidental interruption, providing premium time and materials as needed without extra claim to the Owner.
- 24.5 The Contractor shall repair to the satisfaction of the Engineer any surface or subsurface improvements damaged during the course of the work, unless such improvement is shown to be abandoned or removed.
- 24.6 Machine excavation shall not be permitted within ten feet of existing gas or fuel lines. Hand excavate only in these areas, in accord with utility company, agency or other applicable laws, standards or regulations.
- 24.7 Protect all new or existing lines from damage by traffic, etc. during construction.
- 24.8 Protect existing trees, indicated to remain with fencing or other approved method. Hold all new subsurface lines outside the drip line of trees, offsetting as necessary to protect root structures. Refer to planting or landscaping plans, or in their absence, consult with the Architect.

PART 25 - SMOKE AND FIRE PROOFING

- 25.1 The Contractor shall not penetrate rated fire walls, ceilings or floors with conduit, cable, bus duct, wireway or other raceway system unless all penetrations are protected in a code compliant manner which maintains the rating of the assembly. Smoke and fire stop all openings made in walls, chases, ceiling and floors. Patch all openings around conduit, wireway, bus duct, etc., with appropriate type material to smoke stop walls and provide needed fire rating at fire walls, ceilings and floors. Smoke and fire proofing materials and method of application shall be approved by the local authority having jurisdiction. Submit means to be used.

PART 26 - QUIET OPERATION, SUPPORTS, VIBRATION AND OSCILLATION

- 26.1 All work shall operate under all conditions of load without any objectionable sound or vibration, the performance of which shall be determined by the Engineer. Noise from moving machinery or vibration noticeable outside of room in which it is installed, or annoyingly noticeable noise or vibration inside such room, will be considered objectionable. Sound or vibration conditions considered objectionable by the Engineer shall be corrected in an approved manner by the Contractor (or Contractors responsible) at his expense.

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- 26.2 All equipment subject to vibration and/or oscillation shall be mounted on vibration supports suitable for the purpose of minimizing noise and vibration transmission, and shall be isolated from external connections such as piping, ducts, etc., by means of flexible connectors, vibration absorbers or other approved means. Surface mounted equipment such as panels, switches, etc., shall be affixed tightly to their mounting surface.
- 26.3 The Contractor shall provide supports for all equipment furnished by him using an approved vibration isolating type as needed. Supports shall be liberally sized and adequate to carry the load of the equipment and the loads of attached equipment, piping, etc. All equipment shall be securely fastened to the structure either directly or indirectly through supporting members by means of bolts or equally effective means. No work shall depend on the supports or work of unrelated trades unless specifically authorized in writing by the Architect or Engineer.

PART 27 - FINAL CONNECTIONS TO EQUIPMENT

- 27.1 The roughing-in and final connections to all electrically operated equipment furnished under this and all other sections of the contract documents or by others, shall be included in the Contract and shall consist of furnishing all labor and materials for connection and proper testing. The Contractor shall carefully coordinate with equipment suppliers, manufacturer's representatives, the vendor or other trades to provide complete electrical and dimensional interface to all such equipment (kitchen, hoods, mechanical equipment, panels, refrigeration equipment, etc.).

PART 28 - WELDING

- 28.1 The Contractor shall be responsible for quality of welding done by his organization and shall repair or replace any work not done in accordance with the Architect's or structural Engineer's specifications for such work. If required by the Engineer, the responsible Contractor shall cut at least three welds during the job for X-raying and testing. These welds are to be selected at random and shall be tested as a part of the responsible Contractor's work. Certification of these tests and X-rays shall be submitted, in triplicate, to the Engineer. In case a faulty weld is discovered, the Contractor shall be required to furnish additional tests and corrective measures until satisfactory results are obtained. All welding to be accomplished by certified welder.

PART 29 - ACCESSIBILITY

- 29.1 The Contractor shall be responsible for the sufficiency of the size of shafts and chases, the adequate clearance in partitions and above suspended ceilings for the proper installation of his work. He shall cooperate with the General Contractor (or Construction Manager) and all other Contractors whose work is in the same space, and shall advise each Contractor of his requirements. Such spaces and clearances shall be kept to the minimum size required to ensure adequate clearance and access.
- 29.2 The Contractor shall locate all equipment which must be serviced, operated, or maintained in fully accessible positions. Equipment shall include but not be limited to junction boxes, pull boxes, contactors, panels, disconnects, controllers, switchgear, etc. Minor deviations from drawings may be made to allow for better accessibility, and any change shall be approved where the equipment is concealed.

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- 29.3 Each Contractor shall provide (or arrange for the provision by other trades) the access panels for each concealed junction box, pull box, fixtures or electrical device requiring access or service as shown on Engineer's plans or as required. Locations of these panels shall be identified in sufficient time to be installed in the normal course of work. All access panels shall be installed in accord with the Architect's standards for such work.
- 29.4 Access Doors; in Ceilings or Walls:
- 29.4.1 In mechanical, electrical, or service spaces:
14 gauge aluminum brushed satin finish, 1" border.
- 29.4.2 In finished areas:
14 gauge primed steel with 1" border to accept the architectural finishes specified for the space. Confirm these provisions with the Architect prior to obtaining materials or installing any such work.
- 29.4.3 In fire or smoke rated partitions, access doors shall be provided that equal or exceed the required rating of the construction they are mounted in.
- 29.4.4 All access doors shall have continuous hinge and screw type cover. Openings shall be sized to allow personal to pass through.

PART 30 - ELECTRICAL CONNECTIONS

- 30.1 The Contractor shall furnish and install all power wiring and fusing complete from power source to motor or equipment junction box, including power wiring through starters. The Contractor shall install all starters not factory mounted on equipment. Unless otherwise noted, the supplier of equipment shall furnish starters with the equipment. Also refer to Division 15 of Specifications, shop drawings and equipment schedules for additional information.
- 30.2 All control, interlock, sensor, thermocouple and other wiring required for equipment operation shall be provided by the Contractor. All such installations shall be fully compliant with all requirements of Division 26 regardless of which trade actually installs such wiring. Motors and equipment shall be provided for current and voltage characteristics as indicated or required. All wiring shall be enclosed in raceways unless otherwise noted.
- 30.3 Each Contractor or sub-contractor, prior to bidding the work, shall coordinate power, control, sensor, interlock and all other wiring requirements for equipment or motors with all other contractors or sub-contractors, to ensure all needed wiring is provided in the Contract. Failure to make such coordination shall not be justification for claims of extra cost or a time extension to the Contract.

PART 31 - MOTORS

- 31.1 Each motor shall be provided by the equipment supplier or manufacturer with conduit terminal box, adequate starting and internal thermal overload protective equipment as specified or required. The capacity shall be sufficient to operate associated driven devices under all conditions of operation and load and without overload, and at least of the horsepower indicated or specified. Each motor

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shall be selected for quiet operation, maximum efficiency and lowest starting KVA per horsepower as applicable. Also, see Division 15 of Specifications for further requirements and scheduled sizes.

PART 32 - CUTTING AND PATCHING

- 32.1 Unless otherwise indicated or specified, each Contractor shall provide his own cutting and patching necessary to install the work specified in this Division. Patching shall match adjacent surfaces to the satisfaction of the Engineer and shall be in accord with the Architect's standards for such work, as applicable.
- 32.2 No structural members shall be cut without the approval of the Engineer and all such cutting shall be done in a manner directed by him.

PART 33 - SLEEVES AND PLATES

- 33.1 Each Contractor shall provide and locate all sleeves and inserts required for his work before the floors and walls are built, or shall be responsible for the cost of cutting and patching required where sleeves and inserts were not installed, or where incorrectly located. Each Contractor shall do all drilling required for the installation of his hangers. Drilling of anchor holes may be prohibited in post-tensioned concrete construction, in which case the Contractor shall request approved methods from the Architect and shall carefully coordinate setting of inserts, etc., with the Structural Engineer and/or Architect.
- 33.2 Galvanized steel sleeves shall be provided for all electrical conduit passing thru concrete floor slabs and concrete, masonry, tile and gypsum wall construction.
- 33.3 Where sleeves are placed in exterior walls below grade, the space between the pipe or conduit and the sleeves shall be packed with mechanical waterstop or other approved material and made completely water tight by a method approved by the Engineer and/or Architect.
- 33.4 Where conduit motion due to expansion and contraction will occur, make sleeves of sufficient diameter to permit free movement of pipe. Check floor and wall construction finishes to determine proper length of sleeves for various locations; make actual lengths to suit the following:
 - 33.4.1 Terminate sleeves flush with walls, partitions and ceiling.
 - 33.4.2 In areas where pipes are concealed, as in chases, terminate sleeves flush with floor.
 - 33.4.3 In all areas where pipes are exposed, extend sleeves ½ inch above finished floor, except in rooms having floor drains, where sleeves shall be extended ¾ inches above floor.
- 33.5 Sleeves shall be constructed of 24 gauge galvanized sheet steel with lock seam joints for all sleeves set in concrete floor slabs terminating flush with the floor. All other sleeves shall be constructed of galvanized steel pipe unless otherwise indicated on the drawings.

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- 33.6 Fasten sleeves securely in floors, walls, so that they will not become displaced when concrete is poured or when other construction occurs around them. Take precautions to prevent concrete, plaster or other materials being forced into the space between pipe and sleeve during construction. Fire and smoke stop all sleeves in a manner approved by the local authority having jurisdiction or per prevailing codes.

PART 34 - WEATHERPROOFING

- 34.1 Where any work pierces waterproofing, including waterproof concrete, the method of installation shall be as approved by the Architect and/or Engineer before work is done. The Contractor shall furnish all necessary sleeves, caulking and flashing required to make openings absolutely watertight.
- 34.2 Wherever work penetrates roofing, it shall be done in a manner that will not diminish or void the roofing guarantee or warranty in any way. Coordinate all such work with the roofing installer.

PART 35 - OPERATING INSTRUCTIONS

- 35.1 Upon completion of all work and all tests, each Contractor shall furnish the necessary skilled labor and helpers for operating his systems and equipment for a period of three days of eight hours each, or as otherwise specified. During this period, instruct the Owner or his representative fully in the operations, adjustment, and maintenance of all equipment furnished. Give at least one week's written notice to the Owner, Architect and Engineer in advance of this period. Contractor shall prepare an agenda for approval by Owner. The Engineer may attend any such training sessions or operational demonstrations. The Contractor shall certify in writing to the Engineer with copy to the Owner and Architect that such demonstrations have taken place, noting the date, time and names of the Owner's representative that were present.
- 35.2 Each Contractor shall furnish three complete bound sets for approval to the Engineer of typewritten and/or blueprinted instructions for operating and maintaining all systems and equipment included in this contract. All instructions shall be submitted in draft, for approval, prior to final issue. Manufacturer's advertising literature or catalogs will not be acceptable for operating and maintenance instructions. Each section shall be properly tabbed, indexed and labeled, with a table of contents. Minimum 3-ring hard cover binder. Include specific part, catalog, model, serial, and shop order numbers; statement of warranties – indexed by section; manufacturer names, P.O.C. for warranties, etc.
- 35.3 Each Contractor, in the above mentioned instructions, shall include the maintenance schedule for the principal items of equipment furnished under this contract and a detailed, easy to read parts list and the name and address of the nearest source of supply.

PART 36 - SCAFFOLDING, RIGGING AND HOISTING

- 36.1 Each Contractor shall furnish all scaffolding, rigging, hoisting, and services necessary for erection and delivery into the premises of any equipment and apparatus furnished. Remove same from premises when no longer required in strict accordance with OSHA Guidelines.

PART 37 - CLEANING

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- 37.1 Each Contractor shall, at all times, keep the area of his work presentable to the public and clean of rubbish caused by his operations; and at the completion of the work, shall remove all rubbish, all of his tools, equipment, temporary work and surplus materials, from and about the premises, and shall leave the work clean and ready for use. If the Contractor does not attend to such daily cleaning immediately upon request, the Engineer and/or Architect may cause cleaning to be done by others and charge the cost of same to the responsible Contractor. Each Contractor shall be responsible or all damage from fire which originates in, or is propagated by, accumulations of his rubbish or debris.
- 37.2 After completion of all work and before final acceptance of the work, each Contractor shall thoroughly clean all equipment and materials and shall remove all foreign matter such as grease, dirt, plaster, labels, stickers, etc., from the exterior of materials, equipment and all associated fabrication. Pay particular attention to finished area surfaces such as lighting fixture lenses, lamps, reflectors, panels, etc.

PART 38 - PAINTING

- 38.1 Each fixture, device, panel, junction box, etc., that is located in a finished area shall be provided with finish of color and type as selected or approved by the Architect or Engineer. **If custom color is required, it shall be provided at no additional cost to the Owner.** All other equipment, fixtures or devices located in finished or unfinished areas, that are not required to have or are provided with finish color or coating shall be provided in a prime painted condition, ready to receive finish paint or coating. All galvanized metal in finished areas and exposed on exterior shall be properly prepared with special processes to receive finish paint as directed and approved by the Architect.

PART 39 - INDEMNIFICATION

- 39.1 The Contractor shall hold harmless and indemnify the Engineer, employees, officers, agents and consultants from all claims, loss, damage, actions, causes of actions, expense and/or liability resulting from, brought for, or on account of any personal injury or property damage received or sustained by any person, persons, (including third parties), or any property growing out of, occurring, or attributable to any work performed under or related to this contract, resulting in whole or in part from the negligence of the Contractor, any subcontractor, any employee, agent or representative.

PART 40 - HAZARDOUS MATERIALS

- 40.1 Any worker, occupant, visitor, inspector, etc., who encounters any material of whose content they are not certain shall promptly report the existence and location of that material to the Contractor and/or Owner. The Contractor shall, as a part of his work, insure that his workers are aware of this potential and what they are to do in the event of suspicion. He shall also keep uninformed persons from the premises during construction. Furthermore, the Contractor shall insure that no one comes near to or in contact with any such material or fumes therefrom until its content can be ascertained to be non-hazardous.
- 40.2 CMTA, Inc., Consulting Engineers, have no expertise in the determination of the presence of hazardous materials. Therefore, no attempt has been made by them to identify the existence or location of any such material. Furthermore, CMTA nor any affiliate thereof will neither offer nor make any recommendations relative to the removal, handling or disposal of such material.

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- 40.3 If the work interfaces, connects or relates in any way with or to existing components which contain or bear any hazardous material, asbestos being one, then, it shall be the Contractor's sole responsibility to contact the Owner and so advise him immediately.
- 40.4 The Contractor by execution of the contract for any work and/or by the accomplishment of any work thereby agrees to bring no claim relative to hazardous materials for negligence, breach of contract, indemnity, or any other such item against CMTA, its principals, employees, agents or consultants. Also, the Contractor further agrees to defend, indemnify and hold CMTA, its principals, employees, agents and consultants, harmless from any such related claims which may be brought by any subcontractors, suppliers or any other third parties.

END OF SECTION.

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DIVISION 26 – ELECTRICAL

SECTION 260502 - DESCRIPTION OF ELECTRICAL SYSTEM

PART 1 – ELECTRICAL – PRIMARY SERVICE

- 1.1 Primary electrical services shall be overhead and underground, single phase, as indicated on the plans.
- 1.2 In general, the utility company will provide the pad-mounted and pole-mounted transformers, primary cable, primary conduit and its terminations. Conduits routed off the property and connected to or near a manhole or pole and all other work shall be in accord with utility company requirements.

PART 2 - SECONDARY SERVICE

- 2.1 Secondary service shall be 120/240/1Ø/3W with solid grounded neutral. See Electrical Power Distribution Wiring Diagram. Trench, backfill, conduit, lugs, conductors, meterbase and CT cabinet by Electrical Contractor, all per utility company standards.

PART 3 - ADDITIONAL UTILITY COMPANY REQUIREMENTS

- 3.1 The Electrical Contractor shall provide the local utility company with a drawing produced by a licensed Land Surveyor acceptable to the utility that locates the centerline of the primary duct. Coordinate further requirements with utility company. Electrical Contractor shall include this cost in their bid.
- 3.2 Contact the utility company for specifics on construction of pads, conduit, etc., prior to bidding the work and determine all their requirements. All work shall be in accord with their standards.
- 3.3 The Owner will pay for all fees from the electrical utility company.
- 3.4 Each contractor, prior to bidding the work, is to contact the electrical utility company and determine the exact points of extension of all underground services in the field with a representative of each utility company. Also, obtain construction details on manholes, transformer pads, pedestal stub-ups, etc., from each utility company as applicable. Extension points indicated on the plans are approximate, and are given for the bidder's information only.

END OF SECTION.

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DIVISION 26 - ELECTRICAL

SECTION 260503 - SHOP DRAWINGS, LITERATURE, MANUALS, PARTS LISTS, AND SPECIAL TOOLS

PART 1 - SHOP DRAWINGS

- 1.1 Each Contractor shall submit to the Architect and/or Engineer, within thirty days after the date of the Contract, sets of shop drawings and/or manufacturer's descriptive literature (coordinate exact quantity with architectural specifications) on all equipment required for the fulfillment of his contract. Each shop drawing and/or manufacturer's descriptive literature shall have proper notation indicated on it and shall be clearly referenced so the specifications, schedules, light fixture numbers, panel names and numbers, etc., so that the Architect and/or Engineer may readily determine the particular item the Contractor proposes to furnish. All data and information scheduled, noted or specified by hand shall be noted in color red on the submittals. The Contractor shall make any corrections or changes required and shall resubmit for final review as requested. Review of such drawings, descriptive literature and/or schedules shall not relieve the Contractor from responsibility for deviation from drawings or specifications unless they have, in writing, directed the reviewer's attention to such deviations at the time of submission of drawings, literature and manuals; nor shall it relieve them from responsibility for errors or omissions of any nature in shop drawings, literature and manuals. The term "as specified" will not be accepted.
- 1.2 If the Contractor fails to comply with the requirements set forth above, the Architect and/or Engineer shall have the option of selecting any or all items listed in the specifications or on the drawings, and the Contractor will be required to provide all materials in accordance with this list.
- 1.3 Review of shop drawings by the Engineer applies only to conformance with the design concept of the project and general compliance with the information given in the contract documents. In all cases, the installing Contractor alone shall be responsible for furnishing the proper quantity of equipment and/or materials required, for seeing that all equipment fits the available space in a satisfactory manner and that piping, electrical and all other connections are suitably located.
- 1.4 The Engineer's review of shop drawings, schedules or other required submittal data shall not relieve the Contractor from responsibility for the adaptability of the equipment or materials to the project, compliance with applicable codes, rules, regulations, information that pertains to fabrication and installation, dimensions and quantities, electrical characteristics, and coordination of the work with all other trades involved in this project.
- 1.5 No cutting, fitting, rough-in, connections, etc., shall be accomplished until reviewed equipment shop drawings are in the hands of the Contractors concerned. It shall be each Contractor's responsibility to obtain reviewed shop drawings and to make all connections, etc. in the neatest and most workmanlike manner possible. Each Contractor shall coordinate with all the other Contractors having any connections, roughing-in, etc., to the equipment, to make certain proper fit, space coordination, voltage and phase relationships are accomplished.
- 1.6 In accord with the provisions specified hereinbefore, shop drawings, descriptive literature and schedules shall be submitted on each of the following indicated items as well as any equipment or systems deemed necessary by the Engineer:

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1.6.1 Power Equipment

- Switchgear and panelboards.
- Circuit breakers or fusible switches, per each type.
- Power and lighting contactors.
- Disconnect switches.
- Fuses, per each type required.
- Magnetic starters, if not submitted with unit equipment by supplier.
- Control components (relays, timers, selector switches, pilots, etc.)
- Building service grounding electrode components.

1.6.2 Raceways

- Conduit (each type).
- Wireways and each type of wireway fitting.
- Junction, pull, and device boxes.

1.6.2 Devices

- Building wire, cable splices, and terminations
- Each type of wiring device and their coverplates.
- Any special items not listed above.

1.6.4 Lighting

- Light fixtures, each by type, marked to indicate all required accessories and lamp selection. Also provide original color selection chart to allow Architect and/or Engineer to indicate color selection.
- Lamps, each by type.
- Lighting standards or poles.
- Photocells, time clocks or other lighting accessories.
- Control systems (lighting).

1.6.5 Miscellaneous

- Control panel assemblies.
- Non-standard junction/pullboxes.

PART 2 - SPECIAL WRENCHES, TOOLS AND KEYS

- 2.1 Each Contractor shall provide, along with the equipment provided, any special wrenches or tools necessary to dismantle or service equipment or appliances installed by him. Wrenches shall include necessary keys, handles and operators for valves, switches, breakers, etc. and keys to electrical panels, etc. At least two of any such special wrench, keys, etc. shall be turned over to the Architect prior to completion of the project. Obtain a receipt that this has been accomplished and forward a copy to the Engineer.

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PART 3 - MAINTENANCE AND OPERATION MANUALS

- 3.1 Upon substantial completion of the project, the Electrical Contractor shall deliver to the Engineers (in addition to the required Shop Drawings) three complete copies of operation and maintenance instructions and parts lists for all equipment provided. These documents shall at least include:
 - 3.1.1 Detailed operating instructions.
 - 3.1.2 Detailed maintenance instructions including preventive maintenance schedules.
 - 3.1.3 Addresses and phone numbers indicating where parts may be purchased.

END OF SECTION.

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DIVISION 26 - ELECTRICAL

SECTION 260504 - CUTTING, PATCHING AND REPAIRING

PART 1 - GENERAL

- 1.1 Each Electrical Contractor shall be responsible for all openings, sleeves, trenches, etc. that he may require in floors, roofs, ceilings, walls, etc. and shall coordinate all such work with the General Contractor and all other trades. He shall coordinate with the General Contractor any openings which he is to provide before submitting a bid proposal in order to avoid conflict and disagreement during construction. Improperly located openings shall be reworked at the expense of the responsible Contractor.
- 1.2 Each Electrical Contractor shall plan his work ahead and shall place sleeves, frames or forms through all walls, floors and ceilings during the initial construction, where it is necessary for conduit, buss duct, conductors, wireways, etc. to go through; however, when this is not done, this Contractor shall do all cutting and patching as well as reinforcement required for the installation of his work, or he shall pay other trades for doing this work when so directed by the Architect. Any damage caused to the buildings by the workmen of the responsible Contractor must be corrected or rectified by him at his own expense.
- 1.3 Each Electrical Contractor shall cut holes in casework, equipment panels, etc. (if any), as required to pass pipes in and out.
- 1.4 Each Electrical Contractor shall notify other trades in due time where he will require openings of chases in new concrete or masonry. He shall set all concrete inserts and sleeves for his work. Failing to do this, he shall cut openings for his work and patch same as required at his own expense.
- 1.5 Openings in slabs and walls shall be cut with core drill. Hammer devices will not be permitted. Edges of trenches and large openings shall be scribe cut with a masonry saw.
- 1.6 Cast iron sleeves shall be installed through all walls where pipe enters the building below grade. Sleeves shall be flush with each face of the wall and shall be sufficiently larger than the entering pipe to permit thorough caulking with lead and oakum between pipe and sleeve for waterproofing.
- 1.7 In all cases, sleeves shall be at least two pipe sizes larger than nominal pipe diameter.
- 1.8 Sleeves passing through exterior wall (none are permitted thru roof) or where there is a possibility of water leakage and damage shall be caulked water tight for horizontal sleeves and flashed and counter-flashed with lead (4 lb.) or copper and soldered to the piping, lapped over sleeve and properly weather sealed. All roof penetrations shall be made inside mechanical equipment curbs, method to be approved by Franklin Monroe School District.
- 1.9 All rectangular or special shaped openings in plaster, stucco or similar materials including gypsum board shall be framed by means of plaster frames, casing beads, wood or metal angle members as required. The intent of this requirements is to provide smooth even termination of wall, floor and ceiling finishes as well as to provide a fastening means for lighting fixtures, panels, etc. Lintels shall be provided where indicated over all openings in bearing walls, etc.

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- 1.10 No cutting is to be done at points or in a manner that will weaken the structure and unnecessary cutting must be avoided. If in doubt, contact the Architect.
- 1.11 Each Electrical Contractor shall be responsible for properly shoring, bracing, supporting, etc. any existing and/or new construction to guard against cracking, settling, collapsing, displacing or weakening while openings are being made. Any damage occurring to the existing and/or new structures, due to failure to exercise proper precautions or due to action of the elements, shall be promptly and properly made good to the satisfaction of the Architect.
- 1.12 All work improperly done or not done at all as required by the Electrical trades in this section will be performed by the General Contractor at the direction of the Contractor whose work is affected. The cost of this work shall be paid for by the Contractor responsible.
- 1.13 All penetrations shall be patched with materials matching that which has been disturbed.

END OF SECTION.

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DIVISION 26 - ELECTRICAL

SECTION 260508 - COORDINATION AMONG TRADES, SYSTEMS INTERFACING
AND CONNECTION OF EQUIPMENT FURNISHED BY OTHERS

PART 1 - COORDINATION

- 1.1 The Contractor is expressly directed to read the General Conditions and all sections of these specifications for all other trades and to study all drawings applicable to his work, including Architectural, Plumbing Fire Protection, Mechanical and Structural drawings, to the end that complete coordination between trades will be affected. Each Contractor shall make known to all other contractors the intended positioning of materials, raceways, supports, equipment and the intended order of his work. Coordinate all work with other trades and proceed with the installation in a manner that will not create delays for other trades or affect the Owner's operations.
- 1.2 Special attention to coordination shall be given to points where raceways, fixtures, etc., must cross other ducts or conduit, where lighting fixtures must be recessed in ceilings, and where fixtures, conduit and devices must recess into walls, soffits, columns, etc. It shall be the responsibility of each Contractor to leave the necessary room for other trades. No extra compensation or time will be allowed to cover the cost of removing fixtures, devices, conduit, pipes, ducts, etc. or equipment found encroaching on space required by others. At least 8" of clear space must be available above each recessed light fixture.
- 1.3 The Contractor shall be responsible for coordination with all trades to insure that they have made provision for connections, operational switches, disconnect switches, fused disconnects, etc., for electrically operated equipment provided under this or any other division of the specifications, or as called for on the drawings. Any connection, circuiting, disconnects, fuses, etc., that are required for equipment operation shall be provided as a part of this contract.
- 1.4 If any discrepancies occur between accompanying drawings and these specifications and drawings and specifications covering other trade's work, each trade shall report such discrepancies to the Architect far enough in advance so that a workable solution can be presented. No extra payment will be allowed for relocation of fixtures, devices, conduit, and equipment not installed or connected in accordance with the above instructions.
- 1.5 In all areas where air diffusers, devices, lighting fixtures and other ceiling-mounted devices are to be installed, the Mechanical Trade(s) and the Electrical Trade and the General Trades shall coordinate their respective construction and installations so as to provide a combined symmetrical arrangement that is acceptable to the Architect and Engineer. Where applicable, refer to reflected ceiling plans. Request layouts from the Architect or Engineer where in doubt about the potential acceptability of an installation.

PART 2 - INTERFACING

- 2.1 Each Electrical Trade, Specialty Controls Trade, Mechanical Trade and the General Trades, etc., shall insure that coordination is effected relative to interfacing of all systems. Some typical interface points are (but not necessarily all):

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- 2.1.1 Connection of Power lines to Owner's existing or new services.
- 2.1.2 Connection of all controls to equipment.
- 2.1.3 Electrical power connections to electrically operated (or controlled) equipment.
- 2.1.4 Electrical provisions for all equipment provided by other trades or suppliers within this contract.

PART 3 - CONNECTION OF EQUIPMENT FURNISHED BY OTHERS

- 3.1 Each Contractor shall make all connections to equipment furnished by others, whenever such equipment is shown on any part of the drawings or mentioned in any part of the Specifications, unless otherwise specifically specified hereinafter.
- 3.2 All drawings are complementary, one trade of the other. It is the Contractor's responsibility to examine all drawings and specifications to determine the full scope of his work. The project Engineers have arranged the specifications and drawings in their given order solely as a convenience in organizing the project, and in no way shall they imply the assignment of work to specific trades, contractors, subcontractors or suppliers.
- 3.3 Supervision to assure proper installation, functioning and operation shall be provided by the Contractor furnishing the equipment or apparatus to be connected.
- 3.4 Items indicated on the drawings as rough-in only (RIO) will be connected by the equipment supplier or Owner, as indicated. The Contractor shall be responsible for rough-in provisions only as indicated. These rough-ins shall be in accord with the manufacturer's or supplier's requirements.
- 3.5 For items furnished by others, relocated, or RIO, the Contractor shall obtain from the supplier or shall field determine as appropriate, the exact rough-in locations and connection sizes for the referenced equipment.
- 3.6 The Contractor shall be responsible for coordinating with the General and all other trades, as necessary, to determine any and all final connections that he is to make to equipment furnished by others.

END OF SECTION.

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DIVISION 26 - ELECTRICAL

SECTION 260510 - SCOPE OF THE ELECTRICAL WORK

PART 1 - GENERAL

- 1.1 Each Electrical Contractor's attention is directed to Section 260501 - General Provisions, Electrical, and all other Contract Documents as they apply to his work.

PART 2 - SCOPE OF THE ELECTRICAL WORK

- 2.1 The Electrical work for this project includes all labor, materials, equipment, fixtures, excavation, backfill and related items required to completely install, test, place in service and deliver to the Owner complete electrical systems in accordance with the accompanying plans and all provisions of these specifications. This work shall primarily include, but is not limited to the following:
- 2.1.1 All conduits, conductors, outlet boxes, fittings, etc.
 - 2.1.2 All switchgear, panels, disconnect switches, fuses, transformers, contactors, etc.
 - 2.1.3 All wiring devices and device plates.
 - 2.1.4 All light fixtures and lamps.
- 2.2 Electrical connection to all electrically operated equipment furnished and/or installed by others, including mechanical equipment, etc.
- 2.3 Inspection of electrical system by an approved Electrical Inspector, in compliance with local requirements.
- 2.4 Grounding, per NEC and the specified requirements.
- 2.5 All necessary coordination with electric utility company, etc., to insure that work, connections, etc. that they are to provide is accomplished.
- 2.6 All necessary fees and cost for permits, inspections, etc. Provision of electrical power, service into the buildings from the utility termination points outside.

END OF SECTION.

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SECTION 260519 - CONDUCTORS, IDENTIFICATION, SPLICING DEVICES & CONNECTORS

PART 1 - GENERAL

- 1.1 This section of the Specifications covers all of the electrical power, lighting, and control power (line voltage) conductors, but does not include signal conductors which will be provided by the Contractor, as specified elsewhere.
- 1.2 **No more than 40% conduit fill is permitted for any conduit system, including video, intercom, data, power or other signal circuits.**
- 1.3 No more than five conductors shall be installed in conduit for except for switch legs and travelers in multi-point switching arrangements. No more than seven conductors for computer circuits.
- 1.4 Neutrals shall not be shared. Pull separate neutrals for each branch circuit. In these cases, a maximum of seven conductors is permitted in a conduit.
- 1.5 No more than 3 phases shall be installed in a single raceway. If more than any one A, B, or C phase is pulled in a raceway than an additional ground shall be pulled in for each additional similar phase.

PART 2 - MATERIALS

2.1 CONDUCTORS

- 2.1.1 All conductors shall be 98% conductive annealed copper unless otherwise noted, UL listed and labeled.
- 2.1.2 Lighting and receptacle branch circuits shall be not less than #12 copper wire or as sized shown on the drawings with colored Type THW or THWN insulation. All feeder circuits shall be Type THW or THWN of the size as shown on the Contract Drawings. Conductor sizes indicated on drawings are based upon 75° C rating.
- 2.1.3 Conductors #10 and smaller sizes of wire shall be solid. Conductors #8 and larger sizes shall be stranded. A 200 lb test nylon line shall be installed in all empty conduit and stubs for future use, as indicated. Conductors for control wiring shall be stranded, and in compliance with NEC 760.
- 2.1.4 All wire on the project shall be new, in good condition, and shall be delivered in standard coils or reels.
- 2.1.5 The color of the wire shall be selected to conform with Section 210-5 of the latest edition of the National Electrical Code. Refer also to 260519-4.1, Color Coding.
- 2.1.6 All equipment grounding conductors #6 AWG or less shall have green color insulation. Those larger than #6 shall be green taped 4" at each termination, pull and junction boxes.

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- 2.1.7 Conductors used for motor connections and connections to vibrating or oscillating equipment shall be extra flexible.
- 2.1.8 Conductors 150V to ground and less and greater than 100' in length shall be increased at least one size to compensate for voltage drop. For higher voltages up to 600 volts, provide similar increase in wire size. All branch circuits shall be 3% maximum voltage drop.
- 2.1.9 Conductors for main ground from neutral bus, equipment grounding bus, building steel, grounding grid and main cold water pipe connection shall be bare copper.
- 2.1.10 All conductors shall be identified by color code and by means of labels placed on conductors in junction boxes and at terminal points with Brady, Gardner, T & B or approved equivalent labels indicating source, circuit No. or terminal No.
- 2.1.11 MC cable is not permitted for use on this project.

2.2 SPLICING DEVICES & CONNECTORS

- 2.2.1 Splicing devices for use on #14 to #10AWG conductors shall be pressure type such as T & B "STAKON", Burndy, Reliable or approved equivalent. Wire nuts shall be spring pressure type, insulation 600V, 105 deg. C insulation, up to #8 size. Greater than #6 Cu shall be a compression type connection, 600V insulation, cold shrink tubing, taped, for full insulation value.
- 2.2.2 Terminating pressure applied ring type (or fork with upturned ends) terminations shall be employed on motor and equipment terminals where such terminals are provided on motor and equipment leads or on all stranded wire terminations using #10 AWG or smaller conductors.
- 2.2.3 The use of split-bolt clamps is not permitted.
- 2.2.4 Large connectors (lugs) shall be compression, hydraulically set. Lugs furnished on equipment shall be per manufacturer's recommendations.
- 2.2.5 No aluminum conductors shall be used.

PART 3 – INSTALLATION

- 3.1 The pulling of all wires and cable on this project shall be performed in strict compliance with applicable sections of the National Electrical Code. No conductor entering or leaving a cabinet or box shall be deflected in such a manner as to cause excess pressure on the conductor insulation and after all insulation and insulating bushings are in place.
- 3.2 The radius of bending of conductors shall be not less than eighteen (18) times the outside diameter of the conductor insulation.
- 3.3 Conductors installed within environmental air plenums shall be per N.E.C., teflon-type insulation or approved equivalent.

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- 3.4 Cables that are installed exposed shall not be routed across ceilings or ductwork. They shall be held up against building structure or against permanent support members. They shall be installed in such a manner that they do not interfere with the operation of equipment or removal of ceiling tiles. Nylon tie-wraps shall be installed in such a manner so as to bundle conductors neatly, allowing runouts of single conductors or groups to drop down to equipment served. Install grommeting where dropping out of trays or into panels or service columns. Install sleeves with bushings where penetrating partitions. Firestop sleeves with approved material. Do not penetrate firewalls if so indicated on plans.
- 3.5 Maximum permissible pulling tensions, as recommended by the manufacturer for any given type of cable or wire installed shall not be exceeded. Utilize special remote readout equipment as required to ensure compliance. All cables shall be installed in raceway or routed through bridle rings. All low voltage cabling concealed within walls shall also be installed in conduit.

PART 4 - COLOR CODING DISTRIBUTION VOLTAGE CONDUCTORS, 600 VOLT OR LESS

- 4.1 Conductors to be color coded as follows:
- 4.1.1 120/240 Volt Conductors
Phase A - Black
Phase B - Red
Neutral – White
Ground – Green
- 4.1.3 Control Wiring - Yellow, or as indicated.
- 4.1.4 Conductors within enclosures that may be energized when enclosure disconnect is off - yellow, or taped with ¼" yellow tape every 6" of length, inside enclosure. Provide lamacoid plate warning sign on front of enclosure where this condition occurs.
- 4.1.4 D.C. Wiring - Positive - Light Blue
Negative - Dark Blue

END OF SECTION.

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DIVISION 26 - ELECTRICAL

SECTION 260526 - GROUNDING

PART 1 - GENERAL

- 1.1 All metallic conduit, raceways, wireways, supports, cabinets and equipment shall be grounded in accordance with the latest issue of the National Electrical Code, as shown on the Contract Drawings and in accord with the requirements of the local authority having jurisdiction, as applicable.
- 1.2 The size of the equipment grounding conductors, grounding electrode conductors and service grounding conductors shall be not less than that given in Article No. 250 of the National Electrical Code, and/or as shown on the Contract Drawings. Where ungrounded conductor sizes are increased to minimize voltage drop, grounded conductor sizes shall be increased in the proper proportion.
- 1.3 Grounding bus and non-current carrying metallic parts of all equipment and raceway systems shall be securely grounded by connection to common ground.
- 1.4 The service entrance main ground bus shall also be connected to the main cold metallic water pipe within three feet of where it enters the building, on both the house and street sides of the main shut-off valve with a properly sized bonding jumper. A properly sized bonding jumper shall also be provided to the frame of any steel structure utilized in the construction. The steel frame of the building (if any) shall be made electrically continuous. Also provide connection to driven ground rods as specified.

PART 2 - MATERIALS

- 2.1 Ground wires and cables shall be of the AWG sizes shown on the Contract Drawings or shall be sized in accord with the prevailing codes. All ground wires and cables shall be copper.
- 2.2 All grounding fittings shall be heavy cast bronze or copper of the mechanical type except for underground installations or interconnection of grounding grid to cable, columns and ground electrodes, which shall be thermally welded type as manufactured by Cadweld, Burndy Co., Therm-O-Weld, or approved equivalent.
- 2.3 Other bonding clamps or fittings in above ground locations shall be as manufactured by O.A. Co., T & B, Burndy, or approved equivalent.
- 2.4 Ground electrode pipe systems shall be solid copper construction. Ground rods shall be 5/8" minimum diameter, eight feet long, copperweld steel. All ground electrode systems shall be installed in accord with manufacturer's recommendations, U.L. listings, National Electrical and National Electrical Safety Codes. Top of all ground rods shall be at 12" below grade. Provide well access for testing at one (1) rod.

PART 3 - INSTALLATION

- 3.1 All grounding conductors shall be protected from mechanical injury and shall be rigidly supported. Where ground conductors are run through flexible conduit and through panelboard switchboard or

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- motor control center feeders, they shall be securely bonded to such conduit thru the use of grounding bushings at the entrance and exit. All connection of equipment shall be made with an approved type of solderless connection and same shall be bolted or clamped to equipment or conduit.
- 3.2 Equipment grounding conductors shall be run to lighting fixtures, devices, receptacles, electric heaters, furnace and other equipment. Equipment grounding conductors not exceeding No. 6 AWG in size shall be green colored Type "THWN". Those larger than No. 6 shall be green (same color everywhere) taped 4" at each termination, pull and junction boxes.
- 3.3 Equipment ground connections to GFI circuit breakers shall be carried and bonded to each outlet on the circuit. Provide a separate equipment grounding conductor with green color insulation.
- 3.4 Resistance to the grounding at the service entrance equipment shall be in accordance with the N.E.C., and shall not exceed five ohms.
- 3.5 When grounding systems are completely installed and all grading in the area of the service grounding electrode has been completed up to finish elevations, perform a fall-of potential to determine actual system resistance to earth. Report results to the Engineer in writing. Refer to testing provisions in this section of specifications.
- 3.6 The Contractor shall ensure that the ground return path thru building structural steel or other means is electrically continuous back to the service grounding electrode and is of adequate capacity and impedance to carry the maximum expected fault or other current. Where no electrically continuous steel building frame is available, the Contractor shall provide a properly sized ground bar and ground conductor routed back to the main facility ground bus.
- 3.7 Where a building's steel frame is made electrically discontinuous by masonry breaks (as at firewalls, etc.), the Contractor shall provide an accessible thermally welded bonding jumper of #500MCM copper to bond the building steel frame sections together, making the entire steel frame electrically continuous. The installation of these bonding jumpers shall be reviewed by the Engineer prior to their being covered by construction.
- 3.8 Grounding connections shall **never** be made to fire protection, natural gas, flammable gas or liquid fuel piping, except where specifically indicated on the plans.
- 3.9 Where dielectric fittings are utilized in piping systems, the piping system shall **not** be utilized as a ground path. Bonding jumpers shall not be utilized to bridge over such fittings. Piping systems shall **not** be utilized as ground paths except where specifically required by codes in the case of water piping.
- 3.10 **At all metallic outlet boxes, bond the equipment grounding conductor to the box.**

PART 4 - GROUND TESTING PROCEDURE

- 4.1 The actual resistance to earth of the service grounding electrode shall be measured by the Contractor via the fall-of-potential method. This testing shall be accomplished after the grounding electrode has been completely installed and the finished grade is achieved.

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- 4.2 The results of the testing shall be summarized in a written report by the Contractor, which shall be forwarded to the Engineer for review. The report shall also be included with the operation and maintenance manuals for the Owner's information and future reference. This report is to also contain a detailed description and illustrations of the testing procedure, along with the name and model number of the testing instrument(s).
- 4.3 For the actual testing, the Contractor shall follow the procedures outlined below. A self-contained instrument such as a "Megger" or "Ground OHMMETER" shall be used that is designed to eliminate the influence of stray current effects on the accuracy of the measurements.
 - 4.3.1 Connect one side of the instrument to the grounding electrode conductor where it connects to the facility main ground bus (point C1). Disconnect and isolate the grounding electrode conductor for the test.
 - 4.3.2 Drive a copperweld reference electrode probe (point C2) into earth between 300 and 500 feet away from C1 and connect to measurement instrument.
 - 4.3.3 Drive the movable grounding probe (C3) into earth at ten equally spaced intervals, in a straight line between C1 and C2 points and note the $E/I=R$ resistance readings on a graph at each point.
 - 4.3.4 The resistance measurements in OHMS taken from the flat part of the curve shall be averaged to determine the true grounding electrode resistance to earth.
 - 4.3.5 At completion of testing, remove reference electrode C2 and all temporary wiring and connections.
 - 4.3.6 If actual measurements of grounding electrode indicate a resistance greater than five OHMS, contact the Engineer for instructions. If deemed necessary by the Engineer, additional electrodes shall be placed and the measurement process repeated until the desired ground potential is achieved.

END OF SECTION.

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DIVISION 26 - ELECTRICAL

SECTION 260531 - CABINETS, OUTLET BOXES & PULL BOXES

PART 1 – GENERAL

- 1.1 This section of the specifications covers all electrical cabinets, outlet boxes and pull boxes.
- 1.2 Continuous runs of conduit shall have pull boxes at least each eighty-five (85) feet of run, or as near as possible to that limit.

PART 2 - MATERIALS & INSTALLATION

2.1 Cabinets, Outlet & Pull Boxes:

- 2.1.1 Cabinets for lighting and power, telephone, pull boxes, outlet boxes, or any other purposes specified or shown on the Contract Drawings, shall be constructed of code gauge, galvanized steel with sides formed and corner seams riveted or welded before galvanizing. Boxes assembled with sheet metal screws will not be accepted. Pull boxes shall include all boxes used to reduce the run of conduit to the required number of feet or bends, supports, taps, troughs, and similar applications and shall also be constructed as specified above. All cabinets and boxes for NEMA 1 and 1A application shall be provided with knockouts, as necessary, or shall be cut in the field by approved cutting tools which will provide a clean symmetrically cut opening. All boxes, except panels, shall be provided with code gauge fronts with 1/4 turn fasteners. Fronts for panels shall be as specified under "Panelboards".
- 2.1.2 Ceiling outlet boxes shall be galvanized steel, 4" octagonal, not less than 2 1/8" deep, with lugs or ears to secure covers, and those for use with ceiling lighting fixtures shall be fitted with 3/8" fixture studs fastened to the back of the boxes, where applicable.
- 2.1.3 Special size concealed outlet boxes for clocks, speakers, alarms, TV, etc., shall be provided by the manufacturer of the equipment.
- 2.1.4 Floor outlet boxes shall be fully adjustable stamped steel.
- 2.1.5 Unless otherwise noted on the drawings or in the specifications, outlet boxes shall be installed at the following heights to bottom of box:

| | |
|-------------|--------------------------|
| Panels | 76" to top |
| Disconnects | 5'-0" max. to centerline |

- 2.1.6 The location of outlets, as shown on the drawings, shall be considered as approximate only. It shall be incumbent upon this Contractor to study the general building drawings, with relation to spaces surrounding each outlet, in order to make his work fit the work of others and in order that when the fixtures are installed, they will be symmetrically located and will not interfere with any other work or equipment. Any change in fixture or layout shall be coordinated with and approved by the A-E before this change is made.

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- 2.2 Cabinets, outlet boxes (FTGS) and junction or pull boxes (FTGS) shall be threaded for rigid-threaded conduit, dust-tight vapor-tight or weatherproof as required for areas other than for NEMA 1 or 1A application. These shall be as manufactured by Crouse-Hinds, Appleton, Pyle-National, Killark, or approved as equivalent.
- 2.2.1 NEMA 1 or 1A cabinets, outlet boxes or pull or junction boxes shall be as manufactured by Appleton, Steel City, T & B, or approved equivalent. They shall be sized per N.E.C., Article 370.
- 2.2.2 Outlet boxes for switches, receptacles, telephone, etc., concealed in walls shall be galvanized steel, 4" X 4" X 2-1/8" with plaster cover for one (1) or two (2) devices, as required to be flush with face of finished wall. Where outlet boxes are installed in walls of glazed tile, brick, concrete block, or other masonry which will not be covered with plaster or in walls covered by wood wainscot or paneling, deep sectional masonry boxes shall be used and they shall be completely covered with the plates or lighting fixtures. This Contractor shall cooperate with the brick layers, block layers and carpenters to insure that the outlet boxes are installed straight and snugly in the walls. Receptacles shall be set vertically in walls. Circuit numbers shall be written inside all boxes with black, permanent marker.
- 2.2.3 Exterior outlet boxes shall be weather proof with gasketed covers and baked on grey enamel finish, per ANSI 61. Shall be flip up type with locking capabilities.
- 2.2.4 Outlet boxes mounted in glazed tile, brick, concrete block or other types of masonry walls shall be mounted above or below the mortar joint. Do Not Split The Mortar Joint.
- 2.2.5 Boxes for more than two (2) devices shall be for number of devices required and shall be one piece. No ganging of single switch boxes will be allowed.
- 2.2.6 Outlets for use on this project shall have only the holes necessary to accommodate the conduit at the point of insulation and shall be rigidly secure in position. Boxes with knockout removed and openings not used shall be replaced.
- 2.2.7 Boxes up to 4-11/16 square size shall be fastened to their mounting surface with two fasteners of proper size. Larger sizes shall be fastened with four fasteners, minimum.

PART 3 - SPECIAL NOTICE

- 3.1 Openings for conduit entrance in cabinets and boxes shall be prefabricated, punched, drilled and/or reamed. The use of a cutting torch for this purpose is prohibited.

END OF SECTION.

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DIVISION 26 - ELECTRICAL

SECTION 260533 - RACEWAYS & FITTINGS

PART 1 - GENERAL

- 1.1 This section is intended to specify the raceways, conduit, conduit fittings, hangers, junction boxes, splice boxes, specialties and related items necessary to complete the work as shown on the drawings and specified herein.
- 1.2 This section specifies basic materials and methods and is a part of each Division 26 Section that implies or refers to electrical raceways specified therein.
- 1.3 The types of raceways specified in this section include the following:
 - Intermediate metal conduit (IMC)
 - Rigid galvanized steel conduit (GRS)
 - Liquid - tight flexible metal conduit.
 - Rigid nonmetallic conduit.
- 1.4 For each piece of cord-connected or flexible conduit connected items of equipment in the kitchen, provide a kellems or equivalent strain relief grip at each end of connector, to prevent pullout if equipment is rolled or shoved by cleaning personnel.
- 1.5 Refer to the Architect's details for fire-rated grids and gypsum board expanses that protect certain areas of the steel construction of the building. This rated partition shall not be penetrated by electrical or mechanical work unless absolutely necessary, and then equivalent firestopping methods to restore the rating of the plane shall be provided.
- 1.6 No electrical raceways are to be embedded horizontally within concrete slabs, footings or foundation walls. Note that all piping, conduit, etc., penetrations thru precast planks shall be done in a manner approved by the precast installer. All sleeves for lines run thru precast horizontal planks or grade beams shall be coordinated by each trade with the General Contractor, the Precast Manufacturer and in a manner as approved by the Architect and Structural Engineer.
- 1.7 All raceways, as listed in 1.3 above and otherwise specified herein shall be provided in compliance with latest editions of all applicable U.L., NEMA, NEC and ANSI standards. All conduit, raceways and fittings shall be Underwriters Laboratories listed and labeled, or bear the listing and label of an agency acceptable to the local authority having jurisdiction.
- 1.8 Conduit and raceways, as well as supporting inserts in contact with or enclosed in concrete shall comply with the latest edition of all A.C.I. standards and the equipment manufacturer's recommendations for such work.
- 1.9 PVC or other non-metallic conduit shall be rated for the maximum operating temperature that could be developed by the conductors it encloses, while in normal operation.

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- 1.10 The decision of the Engineer shall be final and binding in any case where a question or inquiry arises regarding the suitability of a particular installation or application of raceways, supports or materials, if other than outlined herein.
- 1.11 Minimum size of conduit shall be 3/4" trade size. All conduit and raceways shall be sized for the number of conductors contained, in accord with the latest edition of the National Electrical Code or any other applicable standards.
- 1.12 The installer of raceway systems shall avoid the use of dissimilar metals within raceway installations that would result in galvanic-action corrosion.

PART 2 - MATERIALS

- 2.1 **RIGID GALVANIZED STEEL CONDUIT:** Rigid galvanized steel conduit shall be used where subject to physical damage for exposed work in mechanical spaces, within factory or other industrial work areas, for exposed fit-up work on machinery, for exposed interior and exterior damp or wet location work, where installed in tunnels or crawl spaces, in hazardous atmospheres, in exterior underground locations where installed beneath roadways, where ells occur in underground PVC conduits, or where turning out of concrete encased duct banks, and at other locations as specifically called out on the drawings. Rigid galvanized steel conduit shall be used for all building interior power wiring.
- 2.2 **INTERMEDIATE METAL CONDUIT:** Unless otherwise indicated on the drawings, intermediate metal conduit (IMC) may be used in any location in place of rigid galvanized steel conduit, as permitted by codes, and as approved by the Engineer.
- 2.3 **LIQUIDTIGHT FLEXIBLE METAL CONDUIT:** Weatherproof flexible metal conduit shall be wound from a single strip of steel, neoprene covered, equivalent to "Liquatite," "Sealtite," or "Liquidtite". It shall be installed in such a manner that it will not tend to pull away from the connectors. Provide strain relief fittings as required where subject to vibration. Flexible connections to motors in dusty areas shall be dust-tight, in areas exposed to the weather - weatherproof. Length shall not exceed 3' unless permitted by the Engineer.
- 2.4 **RIGID NON-METALLIC CONDUIT:** Rigid non metallic conduit shall be constructed of P.V.C, nominally schedule 40 weight, encased in concrete wherein underground locations. If installation will enclose utility company provided conductors, verify exact type required, and install in accord with their standards, where more stringent than this specification in normal building conditions. It shall be U.V.-resistant, rated for 90°C conductor temperature.

Rigid non-metallic conduit may be used in exterior wet or damp locations where installed at least 6" underslab or underground and in exterior underground installations where encased in minimum 4" concrete with metallic marker tape with 12" of grade. It shall not be run in interior locations, except with special permission from the Engineer for use in corrosive environments, and then only if protected from physical damage. No rigid nonmetallic conduit may be installed in environmental air plenums or cast into above-grade concrete slabs. No rigid nonmetallic conduit may be installed in locations where the ambient temperature might exceed the rating of the raceway. Where used underground, provide continuous marker tape with metallic tracer above line as required.

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Where rigid non metallic conduit is placed underground, as for feeder circuits, secondaries or branch circuit runs and where ell is made upward thru a slab on grade, transition the turning ell and the riser to rigid steel conduit to a height of 6" above the concrete slab.

Flexible nonmetallic conduit shall not be used, except by special permission, obtained in writing from the Engineer.

Provide equipment grounding conductors of copper, sized as required by codes, in all circuits installed in rigid nonmetallic raceways.

- 2.5 RACEWAY FITTINGS: Conduit bodies shall be of gray iron or malleable iron. They shall be furnished in proper configurations, avoiding excessive plugged openings. Any openings that are left shall be properly plugged. All coverplates shall be gasketed with neoprene or similar approved materials, rated for the environment. Wiring splices within are not permitted.

Where required, raceway fittings shall be provided in explosion-proof configurations rated for the atmosphere. Place conduit seal off fittings at each device in accord with applicable codes. Seal off fittings shall be packed with wadding, and poured with an approved non-shrink sealing compound.

Expansion fittings shall be provided at all locations where conduits or other raceways cross over expansion joints. Provide copper ground bonding jumpers across expansion fittings.

Conduit bodies, junction boxes and fittings shall be dust tight and threaded for dusty areas, weatherproof for exterior locations and vapor tight for damp areas. Conduit fittings shall be as manufactured by Crouse Hinds, Appleton, Killark or approved equivalent. All surface mounted conduit fittings as with "FS", "FD", "GUB" Types etc., shall be provided with mounting hubs. Exposed conduit and fittings shall be rigid steel with threaded, cast boxes where located within 8'-0" of finished floor.

Where lighting fixtures, appliances or wiring devices are to be suspended from ceiling outlet boxes, they shall be provided with 3/4" rigid conduit pendants. Outlet boxes shall be malleable iron, provided with self-aligning covers with swivel ball joint (minimum 125 lb. support) and No. 14 gauge steel locking ring. Provide safety chain between building structure and ballast housing of light fixtures for all fixtures, appliances or devices greater than 10 lbs weight. Fixtures shall be installed plumb and level. Cover pendants shall be finished to match fixtures.

Fittings for threaded raceways shall be tapered thread with all burrs removed, reamed ends and cutting oil wiped clean.

Indentation or die-cast fittings shall not be permitted in any raceway system.

All conduit fittings shall be securely tightened. All threaded fittings shall engage seven full threads. Fasteners shall be properly torqued to manufacturer's recommendations.

- 2.6 SUPPORTS AND HANGERS: Supports and hangers shall be installed in accord with all applicable codes and standards. They shall be corrosion - resistant, galvanized or furnished with an equivalent protective coating. All electrical raceways shall be hung independently from the building structure with U.L. listed and approved materials. Hangers and supports depending from the support systems

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of other trades work shall not be permitted, except with specific approval in writing from the Engineer. The use of tie wire for support or fastening of any raceway system is prohibited. Perforated metal tape shall not be used for raceway support.

No raceway shall be installed on acoustic tile ceiling tees and support wire, or in any location that will impair the functioning, access or code-required clearances for any equipment or system.

Supports may not be fastened to roof decking or drive pins.

Supports for raceways shall be of materials compatible with the raceway, of malleable iron, spring steel, stamped steel or other approved material. Die-cast fittings are not permitted for supports.

The installing contractor shall provide all necessary supports and braces for raceways, in a rigid and safe installation, complying with all applicable codes.

Individual raceways run on building walls or equipment shall be secured by two hole galvanized malleable iron or stamped steel pipe strap or "minerallac" 2-piece straps. The straps are to be anchored by an approved means such as expansion anchors, toggle bolts, through bolts, etc. Where required by codes or other standards, provide spacers behind mounting clamps to space conduits off walls.

Individual conduits run on building steel shall be secured by means of clamp supports similar and equal to those manufactured by the C.C. Korn Company, Elcen Co., B-Line or approved equivalent. Provide bulb tee clamps, flange clamps, beam clamps, etc.

Vertical and/or horizontal runs of conduit shall be grouped in common hangers on "trapezes" of channel stock as manufactured by "Unistrut" or equivalent, 1-5/8" minimum depth. Utilize conduit clamps appropriate to the channel. Raceways shall not cross one another.

Channel strut systems for supporting electrical equipment or raceways shall be constructed of 16 gauge minimum hot dip galvanized steel with 9/16" diameter holes on 8" centers, with finish coat of paint as manufactured by Unistrut, B-Line, Kindorf, or approved equivalent.

The minimum diameter of round all-thread steel rods used for hangers and supports shall be 1/4", 20 threads per inch. All-thread rod shall be furnished with a corrosion-resistant finish.

Welding directly on conduit or fittings is not permitted.

Provide riser support clamps for vertical conduit runs. Riser support clamps shall be of heavy gauge steel construction. Install riser support clamps at each floor level penetration, or as otherwise required.

Provide conduit cable support clamps for vertical conductor runs as required or indicated on plans. Clamps to be insulating wedging plug, with malleable iron support ring. Install within properly sized and anchored junction box.

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Spring steel clips and fittings such as those manufactured by HITT-Thomas, Caddy-Erico, or approved equivalent, with black oxide finish are permitted in any indoor dry location for concealed work, where acceptable to the local authority having jurisdiction.

2.7 FIRESTOPPING MATERIALS

2.7.1 All conduits, and cables penetrating fire rated floors and walls must be firestopped. Firestopping assembly must be UL listed. All corridor walls, storage room walls and mechanical room walls are to be considered on hour fire rated. The second floor slab shall also be considered one hour rated.

2.7.2 Provide shop drawings indicating penetration detail for each type of wall and floor construction. Shop drawings must be specific for each individual type. (i.e., one hour fire rated gypsum wall board with insulated metal pipe penetration.)

2.7.3 Fire protection products shall be 3M or equivalent by Hilti, STI, and Metacaulk.

2.7.4 The manufacturer of the firestopping materials must provide on site training for the contractor. The training session shall demonstrate to the contractors the proper installation techniques for all the firestopping materials. The training session shall be four hours minimum. Contact the Engineer prior to conducting this training session.

2.7.5 Firestopping materials to include but not limited to the following:

2.7.5.1 Fire barrier wrap/strip.

2.7.5.2 Fire barrier caulk.

2.7.5.3 Fire barrier moldable putty.

2.7.5.4 Fire barrier restricting collar with steel hose clamp.

2.7.5.5 Fire barrier damming materials.

2.7.5.6 Fire barrier composite sheet.

2.7.5.7 Fire barrier fire dam caulk.

2.7.5.8 Steel sleeves.

PART 3 - INSTALLATION

3.1 This Contractor shall lay out and install all conduit systems so as to avoid any other service or systems, the proximity of which may prove injurious to the conduit, or conductors which it confines. All conduit systems, except those otherwise specifically shown to the contrary, shall be concealed in the building construction or run above ceilings. Size of all conduit shall conform to Table No. 1, Chapter 9, of the National Electrical Code, unless otherwise shown on the Contract Drawings.

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- 3.2 No conduit shall be installed in poured concrete slabs, foundation walls or footings. Any conduit installed below slab shall be held 12" below slab and shall be limited to panel feeders, no branch circuits. Conduit shall be held at least 6" from flues or hot water pipes.
- 3.3 All exposed conduit in mechanical spaces or other large room ceilings shall be installed on strut system racks with runs parallel or perpendicular to walls, structural members or intersections of vertical planes and ceilings, with right angle turns consisting of cast metal fittings or symmetrical bends unless otherwise shown. All conduit shall have supports spaced not more than eight feet apart. Supports shall also be provided within 36" of all boxes, bends, and termination points. Where termination points are free standing, support shall be provided within 12". Conduits randomly routed will not be accepted. Conduits shall be concealed in open structure (no finished ceiling) where possible and painted to match.
- 3.4 Groups of branch circuit conduits shall be run above corridor ceilings where possible, and shall not be routed over classrooms. The conduits from wall outlets in classrooms shall be turned out in the zone between the structure or bottom of the gypsum board fire barrier and the room ceiling directly into junction boxes (fastened to the masonry walls, with a minimum of bends. These branch power, lighting and systems conduits shall then be routed along the walls (or structure, in the case of lighting conduits) to emerge thru the corridor walls at the elevations necessary to route with minimal offset to the racked conduit/junction box system mounted on the bottom of the corridor structure. If in doubt about any particular installation, contact the Engineer for clarification prior to proceeding with rough-in work.
- 3.5 Conduit shall be installed in such a manner so as to insure against collection of trapped condensation. All runs of conduit shall be arranged so as to be devoid of traps. Trapped conduit runs shall be provided with explosion proof drains at low points. Runs of conduit between junctions shall not have more than the equivalent of three 90° bends.
- 3.6 Junction boxes shall be installed so that conduit runs will not exceed 85', or as shown on the Contract Drawings. Sizes of junction boxes shall be in accord with Article 370 of the N.E.C.
- 3.7 Underground electric, cable TV, telephone service or other steel conduit and underfloor steel conduit below the concrete floor slab shall be painted with two coats of bitumastic paint.
- 3.8 All underground or underfloor conduits shall be swabbed free of all moisture and debris before conductors are pulled.
- 3.9 Install electrical raceways in accordance with manufacturer's written instructions, applicable requirements of latest edition of the NEC, and NECA "Standard of Installation", complying with recognized industry practices.
- 3.10 Coordinate with other trades, including metal and concrete deck trades, as necessary to interface installation of electrical raceways and components.
- 3.11 Level and square raceway runs, and install at proper elevations and required heights. Hold tight to structure wherever possible, to maximize available space and not restrict other trades. Do not attach or support from roof deck.

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- 3.12 Complete installation of electrical raceways before starting installation of cables or wires within raceways.
- 3.13 All underground conduits shall be buried to minimum depth of 36" from the top of the concrete encasement or raceway to finished grade, unless otherwise noted on plans. Observe minimum burial requirements of local utility company where their standards or regulations apply. Conduits containing primary power conductors, (higher than 600 volts to ground) shall be 42" to top below finished grade, unless otherwise noted on plans.
- 3.14 Exposed raceways installed in exterior locations shall receive one coat of primer, two coats finish paint after preparation of galvanizing, color selected by Architect. Exposed raceways in interior painted areas shall be similarly painted.

PART 4 – SPECIALTIES

- 4.1 All EMT terminations at junction boxes, panels, etc. shall be made with case hardened locknuts and appropriate fittings, with insulated throat liners. Insulating terminations shall be manufactured as a single unit. The use of split sleeve insulators is not permitted.
- 4.2 All rigid conduit, except main and branch feeders, shall have heavy fiber insulating bushings reinforced with double locknuts. All branch and main feeders shall have insulated bushings with grounding lugs and shall be bonded to enclosures with appropriately sized copper jumpers, except at pad mounted transformers. Bonding jumpers shall be installed as required by the NEC and other applicable codes.
- 4.3 All conduit stubbed through floor during construction shall have openings protected with plastic caps approved for this purpose. Connections on both ends of all flexible conduit shall be equivalent to Thomas and Betts, Ideal, Appleton, Efcor, or approved equivalent, rated for the environment.
- 4.4 Pulling lines shall be left in all open conduit systems and shall be non-metallic, left securely tied off at each end cap any unused conduits.
- 4.5 Where spare raceways terminate in switchboards or motor control centers a fishtape barrier shall be provided.
- 4.6 All outlet, pull and junction boxes shall be grounded with pigtail to the equipment grounding conductor.
- 4.7 All empty raceways inside switchgear and open spaces shall be capped.

END OF SECTION.

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DIVISION 26 - ELECTRICAL

SECTION 260544 - EXCAVATION, TRENCHING, BACKFILLING AND GRADING

PART 1 - GENERAL

- 1.1 Each Contractor's attention is directed to Section 260501, General Provisions, Electrical and all other contract documents as they may apply to his work.
- 1.2 Each Contractor shall include all excavating, filling, grading and related items required to complete his work as shown on the drawings and specified herein.
- 1.3 Electrical distribution lines and underground telephone or TV cables shall, in no case, be placed in the same trench with sanitary, storm, domestic or fire protection water lines. Telephone or T.V. services shall, in all cases, be placed in a separate trench with minimum two feet separation from electrical power lines.
- 1.4 Depths of bury shall be:
 - 42" minimum to top of primary ducts
 - 36" minimum to top of secondary ducts
 - 36" minimum to top of branch exterior circuits
 - 36" minimum to top of telephone/communications/misc. ducts

PART 2 - SUBSURFACE DATA

- 2.1 Subsurface investigations have been made and the results shown on the drawings. The information was obtained primarily for use in preparing foundation design. Each Contractor may draw his own conclusions therefrom. No responsibility is assumed by the Owner for subsoil quality or conditions other than at the locations and at the time investigations were made.
- 2.2 Materials to be excavated shall be unclassified, and shall include earth, rock, or any other material encountered in the excavation to the depth and extent indicated on the drawings and specified herein. No adjustment in the Contract sum will be made on account of the presence or absence of rock, shale, or other materials encountered in the excavating.

PART 3 - BENCH MARKS AND MONUMENTS

- 3.1 Maintain carefully all bench marks, monuments and other referenced points. If disturbed or destroyed, replace as directed.

PART 4 – EXCAVATION

- 4.1 Each Contractor shall accept the site as he finds it and remove all trash, rubbish and material from the site prior to starting excavation for his work.

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- 4.2 Excavate trenches to sufficient width and depth for proper installation of the work and where required, smooth the bottom on the trench with hand tools in strict accordance with OSHA Guidelines.
- 4.3 Keep trenches free from water while construction therein is in progress. Under no circumstances lay conduit or cable in water. Pumping or bailing water from this Contractor's trenches, which is required during construction shall be accomplished at his expense.
- 4.4 In no case shall excavation work be accomplished that will damage in any way the new structure, existing structures, equipment, etc. Each Contractor shall take the necessary steps to prevent flow of eroded earth by water or landslide onto the property of others, or against the structures. The repair of all such damage, or any other damage incurred in the course of excavation, shall be borne by the responsible Contractor.

PART 5 - BACKFILL

- 5.1 Backfill shall be accomplished with clean debris free earth and the new earth tamped at 12" intervals so as to avoid earth sinks along the trench. The responsible Contractor will be required to return to the project and fill any sunken areas along the route of his work.
- 5.2 Backfill trenches only after conduit and cable have been inspected by Agencies, Engineer and Owner, tested, and locations of pipe lines have been recorded on record drawings. Provide at least one week's written or fax notification to all parties of impending work that needs to be reviewed.
- 5.3 The backfill below paved areas shall be brought to proper grade to receive the sub-base and paving. No paving shall be placed on uncompacted fill.
- 5.4 The backfill below sodded or seeded areas shall be brought to within six inches of finished grade. The remaining six inches shall be backfilled with clean soil. Concrete for concrete encasement shall cure a minimum of 3 days prior to backfill.

END OF SECTION.

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DIVISION 26 - ELECTRICAL

SECTION 260553 - IDENTIFICATIONS

PART 1 - GENERAL

- 1.1 Equipment, disconnect switches, switchgear, panelboards, transformers, and sound equipment, motor starters, pushbutton stations, special device plates, and similar materials shall be clearly marked as to their function and use. Markings shall be applied neatly and conspicuously to the front of each item of equipment with 1/2" black lamacoid plate (or equivalent) with white letters 1/4" high.
- 1.2 Each Electrical Contractor shall provide clearly legible typewritten directories in each electrical panel indicating the equipment, location within area, and area or room of circuit, etc. controlled by each switch, breaker, fuse, etc. These directories are to be inserted into plastic cardholders in each panel. Descriptions to be approved by owner.

Example: 1 Lights, East Side, Room 100
 3 Receptacles, West Wall, Room 200
- 1.3 Branch circuit panelboards and switch gear shall be provided with a black lamacoid plastic plate with 1/2" white letters for panel designation and 1/4" white letters showing voltage and feeder information. Branch circuit switches shall be designated as to function. Panelboard and switchgear labels shall indicate the source they are fed from, and the circuit number at that source. Clearly indicate the exact label legend to be furnished with each panelboard and switchgear on the shop drawings for each item of equipment prior to submission of shop drawings. Refer to drawings for further detail.
- 1.4 Lamacoid plates shall be located at center of top of trim for branch circuit panels, switch gear, and centered at side for branch circuit switches. Fasten with self-tapping stainless steel screws or other approved method.

END OF SECTION.

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DIVISION 26 - ELECTRICAL

SECTION 262400 - ELECTRICAL DISTRIBUTION EQUIPMENT

PART 1 - BRANCH PANELBOARDS

- 1.1 This section covers lighting and power panelboards (refer to schedule and notes on Contract Drawings and Power Distribution Riser Diagram, of the Contract Drawings).
- 1.2 All panelboards shall be of the circuit breaker type, and shall be of one manufacturer.
- 1.3 Branch panelboards shall be as indicated on the drawings and as specified herein. The lighting panelboards shall be of the dead-front, quick-make, quick-break, bolt-on circuit breaker type, with trip indicating and trip free handles. All circuits shall be clearly and properly numbered and shall be provided with thermal magnetic protection.
- 1.4 The panelboards shall be enclosed in code gauge, galvanized steel cabinets with smooth finished hinged doors without visible external fasteners and heavy chrome locks. Provide baked-on grey enamel finish, in accord with ANSI 61. Panels shall be constructed in accord with Federal Specification W-P-115B Type 1 Class 1, UL67, UL50, NEMA P31, and NFPA 70. Locks shall all be keyed alike.
- 1.5 Each door shall have a directory card inside, covered with a plastic shield, filled in typewritten with circuit numbers and description indicated. Room numbers shall be coordinated with final room numbers as selected by Owner -- not numbers on Contract Documents. Circuit descriptions must be approved by Owner.
- 1.6 Panelboard trim for surface or flush panels shall be double-hinged type, to allow exposure of dead-front breaker portion behind locked door, with screw-fastened gutter trim that is hinged to allow full access to wiring gutters.
- 1.7 Special Note: The room numbers used to fill out the panel directories shall match the actual final name and numbering scheme selected by the Owner. They shall not be filled out per the construction drawing numbering scheme, unless the Contractor is directed to do so by the Architect or Engineer.
- 1.8 Branch panelboards shall be surface or flush mounted as indicated on the Contract Drawings. Flush panels trims shall be tight to wall and interior barriers, with no gaps allowing access to live parts. Oversize trims will not be acceptable.
- 1.9 Note: Where mounted in groups, align top of trim or tub for all panels in an area. Exact mounting height of topline shall be as directed by the Engineer.
- 1.10 Circuit breakers shall be molded-case construction, per U.L. 489, Federal Specifications W-C-375B/GEN MCCB, NEMA AB1. 240V circuit breakers shall be of 65,000 A.I.C. RMS symmetrical rating unless otherwise indicated on the Contract Drawings or required by fault current capacity. Verify with utility company.

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- 1.11 All busses and connections thereto in branch panelboards shall be copper. All bus bars shall extend full length of panelboards.
- 1.12 All circuit breakers used to switch lights shall be SWD (switching duty) rated. All circuit breakers used for H.I.D. lighting shall be H.I.D. rated. All circuit breakers for HVAC loads shall be HVAC rated.
- 1.13 All panelboards shall have full size uninsulated ground busses, insulated full neutral busses.
- 1.14 Panels shall be Square "D", G.E., Siemens or Cutler Hammer.

PART 2 - INSTALLATION INSTRUCTIONS

- 2.1 Panelboards with circuit breakers installed before the building has been finished and cleaned shall be masked.
- 2.2 All dust and debris shall be removed from the panels before they are energized and placed in service. All wires shall be properly formed - no splices are permitted in gutters. On flush units, paint trim to match wall.
- 2.3 All panelboard fronts shall be omitted until final punch list inspection is made. Directories for each panelboard shall be completed and available for review by the A-E at that time. Provide description of load and location, i.e., "Lighting, East Wall, Room 101."
- 2.4 Panelboards of extra height shall be installed at least 18" above floor.

PART 3 - SAFETY SWITCHES

- 3.1 Provide heavy duty safety switches as a final disconnecting means as required by NEC and as indicated on the Contract Drawings.
- 3.2 All safety switches shall be NEMA Type 1 or NEMA 3R and Heavy Duty Type HD and UL listed. Provide uninsulated ground bus in all switches and additional insulated neutral bus if required by circuit.
- 3.3 All safety switches shall have switch blades that are fully visible in the "OFF" (open) position with the door open.
- 3.4 All current carrying parts shall be plated by an electrolytic process to resist corrosion and to promote cooling.
- 3.5 Switch mechanism shall be quick-make, quick-break, load rated, such that during normal operation of the switch, the operation of the contacts shall not be capable of being restrained by the operating handle after the closing and opening action of the contacts has started. The handle and mechanism shall be an integral part of the box (not cover) with facilities for pad locking in the open or closed position with up to three padlocks. NEMA 3R switch doors shall be interlocked with switch handle so that the door can only be opened when the switch is in the "OFF" (open) position.

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- 3.6 Switches shall be as manufactured by Square D., G.E., Siemens, Cutler Hammer or approved equivalent.

PART 4 - FUSES

- 4.1 Upon completion of the building, the Contractor shall provide the owner with spare fuses as shown below. All fuses shall be BUSSMANN, Bourns or Little Fuse.
- 4.2 10% (minimum of 3) of each type and rating of installed fuses shall be supplied as spares:
- 4.2.1 Bussmann, Bourns or Little Fuse spare fuse cabinets - Catalog No. SFC - shall be provided to store the above spares.
- 4.3 uses shall be installed in the equipment until the installation is complete, including tests and inspections required prior to being energized. All fuses shall be of the same manufacturer to insure retention of selective coordination, as designed.
- 4.4 Circuits 601 to 6000 amperes shall be protected by current limiting HI-CAP TIME DELAY FUSES KRP-C. Fuses shall employ "O" rings as positive seals between the end bells and the fuse barrel. Fuses shall be a time-delay type and must hold 500% of rated current for a minimum of 5 seconds, clear 20 times rated current in .01 seconds or less and be listed by Underwriter's Laboratories, Inc., with an interrupting rating of 200,000 amperes R.M.S. symmetrical. The fuses shall be UL Class L.
- 4.5 Circuits 0 to 600 amperes shall be protected by current limiting LOW-PEAK Dual Element Fuses, LPN-RK (250 volts) or LPS-RK (600 volts). All dual element fuses shall have separate overload and short circuit elements. Fuse shall incorporate a spring activated thermal overload element having a 284°F melting point alloy and shall be independent of the short-circuit clearing chamber. The fuse shall hold 500% of rated current for a minimum of 10 seconds and be listed by Underwriters Laboratories, Inc. with an interrupting rating of 200,000 amperes r.m.s. symmetrical. The fuses shall be UL Class RK1.
- 4.6 Motor Circuits - All individual motor circuits rated 480 amperes or less shall be protected by LOW PEAK DUAL-ELEMENT FUSES LPN-RK (250 volts) or LPS-RK (600 volts). The fuses for 1.15 service factor motors shall be installed in rating approximately 125% of motor full load current except where high ambient temperatures prevail, or where the motor drives a heavy revolving part which cannot be brought up to full speed quickly, such as large fans. Under such conditions the fuse should be 150% to 200% of the Type KRP-C HI-CAP Time Delay Fuses of the rating shown on the drawings. 1.0 service factor motors shall be protected by low-peak Dual-Element Fuses (250 volts) or (600 volts) installed in rating approximately 115% of the motor full load current except as noted above. The fuses shall be UL Class RK1 or L.
- 4.7 Circuit breaker panels shall be protected by LOW-PEAK Dual Element fuses LPN-RK (250 volts) or LPS-RK (600 volts) as shown on the drawings. The fuses shall be UL Class RK1.

PART 5 - CONTACTORS

- 5.1 General: Contactors shall be continuously rated at the specified amperes per pole for all types of ballast and tungsten lighting, resistance and motor load. Contactors shall have totally enclosed,

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double-break silver-cadmium-oxide power contacts. Auxiliary arcing contacts will not be acceptable. Contact inspection and replacement shall be possible without disturbing line or load wiring. Contactors shall have straight-through wiring with all terminals clearly marked. Contactors shall have a gasketed NEMA Type 1 (NEMA 12 for electrically-held) enclosure, unless otherwise noted or required.

- 5.2 Contactors shall be approved per UL 508 and/or CSA, and be designed in accordance with NEMA Standards. They shall be industrial-duty rated for applications to 600 volts maximum. I.E.C.-style contactors are not acceptable.
- 5.3 Contactors shall have provisions for factory or field addition of:
 - 5.3.1 Four N.O. or N.C. auxiliary contacts rated 6 amperes continuous at 600 volts.
 - 5.3.2 Single or double circuit, N.O. or N.C., 30 or 60 ampere 600 volt power-pole adder.
 - 5.3.3 Control-circuit fuse holder, one or two fuses.
 - 5.3.4 0.2-60 second adjustable interval timer attachment, if so indicated on plans.
 - 5.3.5 Transient-suppression module for coil control circuit. Coil control to be 120 volts. Provide circuit or step-down transformer.
- 5.4 Mechanically Held Lighting Contactors: Coil-clearing contacts shall be supplied so that the contactor coils shall be energized only during the instance of operation. Both latch and unlatch coils shall be encapsulated. Coils shall be rated for 120 volt operation.
- 5.5 Lighting contactors shall be mechanically held, ASCO 917.

PART 6 - PANELBOARD SCHEDULES

- 6.1 Refer to the drawings.

END OF SECTION.

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DIVISION 26 - ELECTRICAL

SECTION 262726 - WIRING DEVICES AND PLATES

PART 1 - GENERAL

- 1.1 This section of the specifications covers all wiring devices and cover plates, standard, weatherproof and dust-tight.
- 1.2 Wiring devices, listed by manufacturer and catalogue numbers are to establish the quality and type required. Equivalent devices of other manufacturers will be acceptable with prior approval of the Engineer. Submit cutsheets and/or samples of each type ten days prior to bid date for review and written approval to bid. Insofar as possible, standard application or special application devices shall be by one manufacturer.

PART 2 – MATERIALS

| TYPE | RATING | CONFIGURATION | COLOR | VENDOR - CAT. # |
|---|------------------|---------------|-------|--|
| RECEPTACLE - DUPLEX SPECIFICATION GRADE | 125V, 20A | NEMA 5-20R | * | HUBBELL 5362, GE 5362 LEVITON 5362 EAGLE 5362 |
| RECEPTACLE - DUPLEX G.F.I. | 125V, 20A | NEMA 5-20R | * | HUBBELL GF-5352 GE GF-5362 LEVITON 6898 |
| RECEPTACLE – SINGLE | 125V, 20A | NEMA 5-20R | * | HUBBELL 5361 |
| RECEPTACLE, SINGLE TWISTLOCK | 250V, 30A | NEMA 126-30R | BLACK | HUBBELL 2610A |
| RECEPTACLE, DUPLEX WEATHER RESISTANT, GFI | 125V, 20A | NEMA 5-20r | | HUBBELL GFTR20 LEVITON W7599TRE COOPER TWRVGF20 |
| RECEPTACLE, SINGLE | 250V, 20A | NEMA 10-20R | BLACK | HUBBELL 6810 GE 4124 LEVITON 5032 |
| RECEPTACLE, SINGLE | 250V, 50A | NEMA 6-50R | BLACK | HUBBELL 9367 GE 4141 LEVITON 5374 |
| SWITCH, SINGLE POLE | 120/277V, 20A | SPST | * | HUBBELL 1221 GE 5951 LEVITON 1221 |

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| | | | | |
|--|---|-------|--------|---|
| SWITCH, THREE-WAY | 120/277V, 20A | 3-WAY | * | HUBBELL 1223 GE 5953 LEVITON 5953 |
| <p><u>NOTE:</u></p> <p>SWITCH, KEYED TO <u>EACH</u> BE FURNISHED WITH ONE HUBBELL #1209 KEY. TURN OVER TO OWNER AT CLOSE OF PROJECT AND OBTAIN RECEIPT FOR VERIFICATION THAT KEYS HAVE BEEN DELIVERED.</p> | | | | |
| SWITCH, MOMENTARY, 3- POSITION, CENTEROFF SWITCH | 120/277V, 20A (VERIFY VOLTAGE USED) | SPDT | * * | HUBBELL 1556 GRY GE EQUIVALENT |
| <p><u>NOTES:</u></p> <p>1. PROVIDE MATCHING CAP (PLUG) FOR ALL RECEPTACLES 30 AMP RATED AND ABOVE AS REQUIRED FOR EQUIPMENT</p> <p>2. ALL RECEPTACLES SHALL BE BACK OR SIDE-WIRED, CLAMPING TYPE</p> <p>* SEE PART 3, COLOR.</p> | | | | |

2.2 For small motor loads of 3/4 HP or less, single phase, 120 or 277 volts, provide snap-type, H.P. rated motor starter switch without thermal overloads. Hubbell 3031 IA or equivalent Square D or G.E. Provide lockout-type trim plate for each device. Provide with NEMA 1, NEMA 3R or other enclosure suitable for the location and atmosphere. All manual starters in finished areas shall be in flush-mounted enclosures. If the motor to be controlled is not equipped with internal thermal overload protection, overload heaters sized to match the motor nameplate amperes and the ambient temperature shall be provided. All such disconnects shall be mounted next to the motor above ceilings or exposed in mechanical spaces, located in readily accessible areas.

PART 3 - COLOR

3.1 Color of devices shall be grey, except for outlets shown as "SP" and outlets on computer panels, which shall be blue. Samples (devices, plates or both) may be required to be submitted with other architectural color items by the Contractor. The Contractor shall coordinate any such submission required with other trades, the Prime Contractor or as needed.

PART 4 - PLATES AND COVERS

4.1 Unless otherwise specified or noted, all wiring device plates and covers shall be 304 stainless steel, Hubbell or equivalent G.E. or Leviton. Color shall be satin, brushed.

4.2 Cover plates shall be of one manufacture insofar as possible.

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- 4.3 Weatherproof plates for GFCI receptacles shall be cast aluminum, self-closing, gasketed, suitable for standard box mounting, UL listed for wet location in-use listed with Intermatic #WP101MC, Red Dot #CSMGV or Tay Mac #MX3200 cover closed.
- 4.4 Weatherproof switch plates for toggle-handle switches shall be cast aluminum, sealed, for standard outlet boxes, with thru - the cover toggle operation. Hubbell, equivalent G.E., or Leviton.
- 4.5 Cover plates for data/voice outlets with multiple cable feeds shall be multi-gang, thermoplastic, modular, for snap-in terminators as specified elsewhere in the contract documents.

PART 6 - INSTALLATION

- 6.1 All wiring devices in dusty areas, exposed to weather and moisture shall be installed in Type "FS" conduit fittings having mounting hubs, with appropriate cover plates.
- 6.2 Devices that have been installed before painting shall be masked. No plates or covers shall be installed until all finishing and cleaning has been completed. Any device showing paint or dirt shall be replaced.
- 6.3 Provide G.F.C.I. duplex feed-thru style receptacles where indicated or required by the National Electrical Code, whether specifically called out or not. When a G.F.C.I. receptacle is on a circuit with other non-G.F.C.I. receptacles, it shall always be placed at the homerun point of the circuit and shall be wired to ground-fault interrupt protect the downstream outlets on that circuit unless specifically indicated to the contrary. Provide a "G.F.C.I. protected" label on each downstream outlet.
- 6.4 Where surge suppression outlets are provided, they shall be ANSI Category "A" style. They shall be installed as dedicated-circuit outlets or where with multiple outlets on a circuit, they shall be placed at the homerun point of that circuit and feed-thru wired to protect the downstream outlets on that circuit.
- 6.5 All receptacles shall be installed with ground prong at bottom position.
- 6.6 All outlet boxes, in final positions shall be properly fitted, tight to wall, per N.E.C. No jumbo plates shall be used. All receptacles/grounds shall be "pig-tail" bonded to the outlet box (except for isolated grounds).

END OF SECTION.

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DIVISION 26 - ELECTRICAL

SECTION 264313 - SURGE SUPPRESSION SYSTEMS

PART 1 - GENERAL

- 1.1 Each Contractor's attention is directed to Section 260501, General Provisions-Electrical and all other contract documents as they may apply to his work.

PART 2 - SCOPE OF THE WORK

- 2.1 The Contractor shall provide the necessary labor, materials, wiring and services necessary to provide the complete electrical surge protection systems as specified herein. This work shall include, but is not necessarily limited to:
 - 2.1.1 Provision of Surge Suppression Units at certain points in the power distribution network and on telephone and television service lines.
 - 2.1.2 Proper installation of surge suppression unit(s), in accord with shop drawings. Wiring routing, grounding and all connections shall be in exact accord with manufacturer's recommendations.

PART 3 - QUALITY ASSURANCE

- 3.1 Manufacturer shall be regularly engaged in production of surge protection equipment, of types, sizes and ratings required, whose products have been satisfactorily used in similar service for not less than three years.
- 3.2 Comply with NEC and NFPA requirements, as applicable to materials and installation of surge protection components and wiring. Surge protection equipment shall be UL listed and labeled for its intended use. Where applicable, equipment shall comply with ANSI standards for such equipment.
- 3.3 SPECIAL NOTE: The physical routing, length and connections of the unit's phase, neutral and ground conductors are critical to the performance of surge suppression units. The Contractor shall carefully observe and comply with the manufacturer's installation requirements and shall not exceed three feet of length.

PART 4 – SUBMITTALS

- 4.1 Product Data: Submit manufacturer's data on surge protection systems and components as part of shop drawing submissions. Indicate all capacity ratings, clamp times, maximum capacities, physical construction and listing agency approvals.
- 4.2 Maintenance Data: Submit maintenance instructions for surge suppression system. Include this data in Operation and Maintenance manuals.

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PART 5 – MATERIALS

5.1 ACCEPTABLE MANUFACTURERS

- 5.1.1 Available Manufacturers: Subject to compliance with requirements, manufacturers offering surge protection components which may be incorporated in the work include, but are not limited to, the ones listed below. Other manufacturers will be considered if their proposed products are in full compliance with these specification requirements.

Surge Protective Devices:

To be furnished **within** panelboards by such manufacturer.

PART 6 - BUILDING ELECTRICAL SERVICE SURGE PROTECTION SYSTEM COMPONENTS

6.1 GENERAL

- 6.1.1 Provide UL listed and labeled lightning and transient surge protection devices, installed where shown on the drawings and in accord with the manufacturer's recommendations.
- 6.1.2 The surge protection devices shall be shunt type and polyphase, with the ability to conduct high energy transients from line to neutral and neutral to ground. Provide in a NEMA 1 gasketed or NEMA 12 enclosure with hinged front panel. Provide a green L.E.D. or 24V pilot light to illuminate when unit is functioning normally. Provide internal fusing in modules to protect unit. Provide red pilot light to indicate failure of surge suppression or capacity reduction below unit ratings.
- 6.1.3 For each surge suppression unit, categories B provide unit function status indicators. These indicators may be mounted in the face of the equipment panel or remotely, immediately adjacent to the panel. Provide green L.E.D., illuminated for normal operation, red L.E.D. for trouble/fault or reduction of surge suppression capacity. Provide a surge counter for each category "B" units to indicate each suppression operation of the unit.
- 6.1.4 Proposed substitutions for the manufacturer's model numbers listed here shall meet or exceed the current published performance data for the units listed, and shall be submitted to the Engineer ten working days prior to bid for review.
- 6.1.5 Category "B" units shall be provided inside the electrical panelboards.
- 6.1.6 Provide integral fused disconnecting means for each surge protection device.
- 6.1.7 Internal Device Overcurrent Protection (Fusing): All protection modes (including Neutral to Ground) of each surge suppression device shall be internally fused at the component level with fuse I²T capability allowing the suppressor's maximum rated transient current to pass through the suppressor without fuse operation. If the rated I²T characteristic of the fusing is exceeded, the fusing shall be capable of opening in less than one millisecond and clear both high and low impedance fault conditions. The fusing shall be capable of interrupting up to 200 KA symmetrical fault current with 600 VAC applied. This overcurrent protection circuit shall be monitored, to

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provide indication of suppression failure. Conductor level fuses or circuit breakers internal or external to the surge suppression units are not acceptable as meeting this requirement.

6.1.8 Units shall be provided with L.E.D. status monitors and event counters.

6.2 PANELBOARD SURGE SUPPRESSION - CATEGORY "B" PARALLEL-WIRED UNITS

6.2.1 Units shall be installed as indicated on the contract documents, and connected as recommended by the equipment manufacturer.

6.2.2 Category "B" units shall be 120-240 volts, 1Ø-3 Wire service. Voltage peak clamping to occur at approximately 150% of line voltage, or less. Provide fusing and fault indicator pilot lights as in (A) - General above.

PART 7 - EXECUTION

7.1 Installation of Surge Protection Systems:

7.1.1 Install surge protection systems as indicated and in accordance with equipment manufacturer's written instructions, in compliance with applicable requirements of NFPA, local prevailing codes and with UL lightning and power surge protection standards to ensure that surge suppression systems comply with requirements.

7.1.2 Coordinate with other work, including electrical wiring work as necessary to interface installation of units.

7.1.3 Install conductors with direct, shortest possible phase, neutral and ground paths from all in/out connections, avoiding sharp bends and narrow loops.

7.1.4 Install surge suppression units as close as practical to equipment they are protecting. Install appropriate units at main electrical service entrance equipment and secondary branch panelboards as indicated.

7.1.5 Suppressors shall be installed such that conductor lengths are no more than three feet to panel connections.

7.1.6 Where devices are indicated on drawings to be recessed, provide with flush enclosure for recessed mounting.

PART 8 – WARRANTIES

8.1 All surge suppression equipment shall be unconditionally warrantied by the Contractor for a period of one year from the date of substantial completion. If longer manufacturer's warranties are offered, they shall be made available to the Owner. Note these extended warranties in the Operations and Maintenance Manuals.

END OF SECTION.

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DIVISION 26 - ELECTRICAL

SECTION 265113 - LIGHTING FIXTURES AND LAMPS

PART 1 - GENERAL

- 1.1 Furnish and install all lighting fixtures, as herein specified, complete with lamps and accessories for safe and effective operation. All fixtures shall be installed and left in an operable condition with no broken, damaged or soiled parts.
- 1.2 All items furnished shall comply with the latest standards applicable such as U.L., NEMA, etc., and shall bear labels accordingly. All fixtures shall be the color specified or as selected by the Architect. Wherever fixtures have evident damage, they shall be restored to new condition or shall be replaced. Likewise, fixtures showing dirt, dust or fingerprints shall be restored to new condition or shall be replaced.
- 1.3 Eight copies of light fixture factory shop drawings and cuts, showing fixture dimensions, photometric data, installation data and, if applicable, air handling data, shall be submitted to the Engineer for review 30 days after bid date. (Verify shop drawing quantities with the Architect.)
- 1.4 Locate pendant, surface mounted or chain-hung industrial fixtures in mechanical rooms and similar spaces to avoid ductwork and piping. Locate around and between equipment to maximize the available light. Request a layout from the Engineer if uncertain about an installation. All suspended fixtures shall be mounted square and plumb.
- 1.5 Where emergency battery packs are provided with fixtures (if any), they shall be connected to an unswitched power line and wired in accord with the manufacturer's recommendations.
- 1.6 All reflecting surfaces, glass or plastic lenses, ballast housings, parabolic louvers, downlighting Alzak cones and specular reflectors shall be handled with care during installation or lamping to avoid fingerprints or dirt deposits. It is preferred that louvers be shipped and installed with clear plastic bags to protect louvers. At close of project, and after construction air filters are changed, remove bags. Any louver or cone showing dirt or fingerprints shall be cleaned with solvent recommended by the manufacturer to a like-new condition, or replaced as necessary in order to turn over to the Owner new fixtures at beneficial occupancy.
- 1.7 Refer to architectural details as applicable for recessed soffit fluorescent fixtures or wherever fixture installations depend upon work of other trades. Coordinate all installations with other trades. Verify dimensions of spaces for fixtures, and if necessary, adjust lengths to assure proper fit and illumination of diffuser and/or area below.
- 1.8 Pre-manufactured or built to suit flexible wiring systems are not permitted for this project.

PART 2 - VOLTAGE

- 2.1 All lighting fixtures shall be rated 120, 277 or 480 volts, single phase as indicated or required.

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PART 3 - BALLASTS

3.1 Electronic Ballast Specification

3.1.1 Fluorescent ballast shall to be electronic, programmed start to operate at a frequency of 40KHz or higher with less than 2% lamp flicker, at an input voltage of 108 to 132 VAC (120 volt line) or 249 to 305 VAC (277 volt line) at an input frequency of 60 Hz, .88 ballast factor unless otherwise indicated on light fixture schedule. Light output to remain constant for line voltage of $\pm 4\%$. Ballast to comply with EMI and RFI limits set by FCC (CFR 47 part 18) for normal electrical equipment and have less than 1.5 lamp current crest factor (or less if required by the fluorescent lamp supplier). Verify this prior to submitting shop drawings. Ballast to meet ANSI Standard 82.41 and be UL listed Class P, Type I. Ballast shall be non-PCB bearing, shall be rapid start.

3.1.2 Ballast to have less than 10% total harmonic distortion with less than 6% third harmonic distortion. Ballast to have "A" sound rating with a power factor greater than .99 and have a twenty year rated life. Ballast shall contain auto restart circuitry in order to restart lamps without resetting power. Ballasts used shall operate 1, 2, 3 or 4 T8 lamps as specified in the light fixture specification. Use ballast to match number of lamps in fixture, and meet all switching requirements as shown on the drawings. Ballasts shall be unconditionally warranted by the manufacturer for a period of five years from project beneficial occupancy. (Also see light fixture schedule general notes)

3.1.2.1 Sylvania, Advance and GE are acceptable manufacturers.

3.1.2.2 Provide in-line fuse-holder(s), with fuse sized per manufacturer's recommendations for each fixture.

3.2 Where lighting standards have fuses protecting ballasts, an in-line type of fuseholder shall be located at the base of the pole, readily accessible behind the handhole coverplate. Where multiple circuited luminaires are on a single pole, identify the separate fuseholders.

PART 4 - LAMPS

4.1 Lamps furnished and installed in indicated fixtures shall be as manufactured by G.E., Phillips, or Sylvania. Wherever possible, all lamps provided shall be manufactured in the United States of America.

4.2 Fluorescent lamps shall be "Super" T8 (one inch diameter), various lengths, wattages, with 3100 initial lumens and 3000 design lumens for 48" lamps, with a color rendering index (C.R.I.) of 85 or higher, medium bi-pin base configuration. Normal color to be 4100° Kelvin unless specified otherwise on light fixture schedule. Normal power input to be 32 watts for 48" lamps. Lamps to have an average life of 30,000 hours at three hours per start on a programmed start ballast. Lamps to operate at 265MA and shall be low mercury, green cap type. Sylvania, Philips, and General Electric are acceptable manufacturers.

4.3 Compact fluorescent lamps shall be Phillips "PL", G.E. "Biax" or Osram. All compact fluorescent lamp/ballast combinations shall be rated for high power factor. No low power factor lamp/ballast combinations may be used.

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PART 5 - LIGHT FIXTURE GENERAL REQUIREMENTS

5.1 Fluorescent Recessed Lighting Fixtures - General Requirements

- 5.1.1 The following are minimum requirements for recessed fluorescent fixtures for lay-in grid, gypsum board, plaster and concealed spline ceilings. Surface-mounted fluorescent fixture requirements shall be similar.
- 5.1.2 Housings shall be premium specification grade, constructed of a minimum 22 gauge die embossed or stiffened cold rolled pre-treated rust-resistant steel.
- 5.1.3 All parts, including back of fixture, shall be finished with polyester powder or white baked enamel (85% minimum reflectance) painted after fabrication. All wiring shall be type TFN, or THWN and shall be covered by the steel ballast cover, wiring channel, or socket track. Exposed wiring is not acceptable. Connection wiring shall be accessible thru a hinged access plate above ballast channel in top of unit.
- 5.1.4 Flexible manufactured wiring systems such as "Reloc" shall not be permitted.
- 5.1.5 The complete light fixture unit shall be UL listed and labeled. Other agency listings may be acceptable with written approval from the Engineer.
- 5.1.6 Fixture lens doors shall be regressed white aluminum, reversible, hinged, painted after fabrication, with spring-loaded latches.
- 5.1.7 Lens shall be as specified for each fixture type. If a specific manufacturer and series number of lens is listed, the substitute shall be of the exact specification (thickness, prism configurations, transparency, efficiency, photometric distribution, hardness, vandal-resistance, etc.). Minimum average thickness of any prismatic lens shall be 0.125".
- 5.1.8 Fixture trim and/or flanges shall conform with ceiling constructions as required. Verify all types prior to submission of shop drawings and indicate any special types on submittals. Fixtures installed in drywall or plaster ceilings to be provided with flange, screed and swing gate anchoring system.
- 5.1.9 All fixtures shall be furnished with hold down clips to meet applicable seismic codes, four clips per fixture minimum or the equivalent thereof in the installation trim. Contractor to install clips per manufacturer's requirements. If screws are required, they shall be provided. Verify thickness of drywall or plaster ceilings prior to submission of shop drawings, to allow for proper trim adjustment.
- 5.1.10 Support fixtures four wires, with one hanger wire at each end of fixture unit, fastened to the fixture body and to the structure above. Hanger wires shall be installed within 15° of plumb, maximum or additional support shall be provided. Wires shall be attached to the fixture body and to the building structure - not to the supports of other work or equipment. Wire gauge shall be same as ceiling support.
- 5.1.11 Where building structure is located such that 15° cannot be maintained, the Contractor shall provide "Unistrut" or similar structure to meet this requirement.

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- 5.1.12 **Special Note:** This wire suspension and seismic clip requirement shall also apply to exit lights, downlights, emergency battery pack units or any fixture mounted to or supported by lay-in grid ceilings.
- 5.1.13 Each type of fluorescent (or other type) lay-in fixture shall be furnished with the proper housing flange or lip to suit the type of lay-in grid(s) being utilized on the project. The Contractor is to verify if narrow or standard grid members are being furnished and provide the proper type of light fixture trim. Indicate any special trims on shop drawing submittals.
- 5.1.14 Lamps shall be as specified in lamp section of these specifications, and suitable for use in the fixture intended. If the lighting fixture manufacturer requires a specific lamp for optimum performance, that lamp shall be furnished.
- 5.1.15 Do not provide pressure-lock or any other type of lampholder unless specifically indicated to the contrary or required by local codes. Fixtures may be shipped from the factory with lamps installed, at the Contractor's option.
- 5.2 **Industrial and Striplight Fluorescent Fixtures - General Requirements**
- 5.2.1 Units shall have die-formed heavy gauge cold rolled steel channels and die-embossed reflectors.
- 5.2.2 Finishes to be coated with a gloss powder paint or baked enamel finish with a minimum 85% reflectance.
- 5.2.3 Units to have aligner clips where required for a continuous row appearance. Where continuous rows exceed twelve feet in length, provide a "unistrut" channel or similarly adequate mounting to stiffen and align row.
- 5.2.4 Units to have captive latches for ballast covers, heavy-duty lampholders and wire guards where specified. Wire guards shall be heavy-duty #14 wire gauge) minimum with corrosion-resistant plated or vinyl finish.
- 5.2.4.1 Ballasts to be as specified herein.
- 5.2.4.2 Units to be UL listed.
- 5.2.5 Mounting brackets and hanging mechanisms shall be as specified in fixture descriptions, or as required. Allow a generous safety margin with all support systems, as recommended by the manufacturer.
- 5.3 **Exit Lights - General Requirements**
- 5.3.1 All exit lights shall be wall mounted and shall be mounted tight to wall, without back canopies.
- 5.3.2 Provide with stencil face, lettering color red, of sizes in accord with code, or as otherwise specified.
- 5.3.3 Provide single or double face as scheduled, indicated on plans or as required by the local authority

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having jurisdiction. Adjust installation position if required for clear visibility, in accord with applicable codes.

5.3.4 Complete unit to be finished in color as selected by the Architect.

5.3.5 Provide directional arrows as indicated on plans, as scheduled to suit the means of egress or as required by the local authority having jurisdiction.

5.4 LIGHTING FIXTURE SCHEDULE

5.4.1 Note: Each vendor proposing to bid the materials specified herein below is cautioned to review all requirements of the Contract Documents, as they may apply to the work involved. The general materials requirements are to be met in their entirety by the contractors and vendors supplying these materials.

5.4.2 Note: Unless otherwise noted, all 48" dimension fixtures shall be provided with 48" "Super" T8 32 watt 3100 lumen lamps, quantity as specified, with companion 2, 3 or 4 lamp electronic ballasts. Where fixtures with ballasts have switches that controls lamps individually or in groups, the proper number of separate ballasts shall be provided. Refer to the drawings for specific control information.

5.4.3 TYPE DESCRIPTION

Refer to drawings for schedule.

5.4.4 Note: All manufacturers including those specified are to provide Engineer with manufacturer generated and guaranteed computer point-by-point calculations of the Cafeteria, Gym, Media Center, Computer Labs, Lobby and stage. Grid on 2'-0" centers. Utilize 85% ceiling/60% walls/30% floor reflectances, with point-by-points expressed across a 30" high workplane for all printouts. Note: Point-by-points plotted so small as to be illegible when faxed, must be mailed or delivered by hand. Printouts to be submitted with fixture brochures containing photometrics with Isolux patterns ten days prior to bid for written prior approval.

PART 6 – PHOTOCELLS

6.1 Provide 120, 277 or 480 volt (rated as needed), 1000 or 2000 watt photocells as needed for control of certain circuits or fixtures as indicated on plans. They shall be as manufactured by Tork, Paragon, AMF or approved equivalent.

6.2 Mount photocells in locations concealed from sight lines standing on ground unless otherwise noted, in which case the final position shall be as directed by the Architect. Group together (if indicated at one location) and mount on back of parapet wall or otherwise properly support with mounting bracket. Coordinate with roofing installer to ensure that roof penetrations are properly made without violating or lessening the roof warranty in any way. Photocells may be mounted in other locations if it is not practical to install them on roofs or parapets, in which case the Contractor shall request direction for their mounting locations from the Engineer or Architect. Photocells shall always be mounted in a weatherproof, inconspicuous manner.

END OF SECTION.

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SECTION 311000 - SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

1. Protecting existing vegetation to remain.
2. Removing existing vegetation.
3. Clearing and grubbing.
4. Stripping and stockpiling topsoil.

- B. Related Sections:

1. Section 024119 "Selective Demolition" for partial demolition of buildings or structures.
2. Section 031200 "Earth Moving" for soil materials, excavating, backfilling, and site grading.
3. Section 329210 "Erosion Prevention and Sedimentation Control" for preventing erosion and controlling sediment laden runoff from disturbed areas.

1.3 DEFINITIONS

- A. Remove: Remove and legally dispose of items except those indicated to be reinstalled, salvaged, or to remain the Owner's property.

1.4 PROJECT CONDITIONS

- A. Traffic: Conduct site-clearing operations to ensure minimum interference with roads, streets, walks and other adjacent occupied or used facilities. Do not close or obstruct streets, walks, or other occupied or used facilities without permission from authorities having jurisdiction.
 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
- B. Protection of Existing Improvements: Provide protections necessary to prevent damage to existing improvements indicated to remain in place.

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1. Protect improvements on adjoining properties and on Owner's property.
2. Restore damaged improvements to their original condition, as acceptable to property owners. Do not proceed with work on adjoining property until directed by Architect.
3. Protect existing trees to remain, per details contained in the drawings, prior to beginning site clearing work.

1.5 EXISTING SERVICES

- A. General: Indicated locations are approximate; determine exact locations before commencing Work.
- B. Arrange and pay for disconnecting, removing, capping, and plugging utility services. Notify affected utility companies in advance and obtain approval before starting this Work.
- C. Place markers to indicate location of disconnected services. Identify service lines and capping locations on Project Record Documents.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 SITE CLEARING

- A. General: Remove trees, shrubs, grass, and other vegetation, improvements, or obstructions, as required, to permit installation of new construction. Remove similar items elsewhere on site or premises as specifically indicated. Removal includes digging out and off-site disposal of stumps and roots.
- B. Tree Removal: Coordinate with Landscape Architect before beginning removal of trees as indicated on Demolition Plan. Utilize processed tree clearing waste materials (root wads, chipped waste, etc.) for erosion control purposes (mulching of disturbed areas, stabilization of excavations, etc.) to the extent possible. Remove all remaining waste materials following final stabilization of disturbed areas.
- C. Topsoil: Topsoil is defined as friable clay loam surface soil usually found in a depth of not less than 4 inches. Satisfactory topsoil is reasonably free of subsoil, clay lumps, stones, and other objects over 2 inches in diameter, and without weeds, roots, and other objectionable material.
 1. Strip topsoil to whatever depths encountered in a manner to prevent intermingling with underlying subsoil or other objectionable material. Remove heavy growths of grass from areas before stripping.
 2. Stockpile topsoil in storage piles in areas indicated or directed. Construct storage piles to provide free drainage of surface water, and protect from erosion and siltation.
 3. Dispose of unsuitable or excess topsoil on site as directed by the Owner's representative.

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3.2 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.
 - 1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
 - 2. Grind down stumps and remove roots, obstructions, and debris to a depth of 18 inches below exposed subgrade.
 - 3. Use only hand methods for grubbing within protection zones.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
 - 1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches (200 mm), and compact each layer to a density equal to adjacent original ground.

3.3 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.
- B. Dispose of all surplus soil material on site as directed by the Owner's representative.
- C. Separate recyclable materials produced during site clearing from other non-recyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities. Do not interfere with other Project work.

END OF SECTION 311000

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SECTION 312000 - EARTH MOVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Geotechnical Report included in the Contract Documents.
- C. Louisville Metropolitan Sewer District (MSD) Standard Specifications.

1.2 SUMMARY

- A. Section Includes:
 - 1. Preparing subgrades for slabs-on-grade, walks, pavements, lawns, and plants.
 - 2. Excavating and backfilling for buildings and structures.
 - 3. Drainage and moisture-control fill course for concrete slabs-on-grade.
 - 4. Subbase course for concrete walks and pavements.
 - 5. Subbase course and base course for asphalt paving.
 - 6. Subsurface drainage backfill for walls and trenches.
 - 7. Excavating and backfilling trenches for utilities and pits for buried utility structures.
- B. Related Sections:
 - 1. Section 033000 "Cast-in-Place Concrete" for granular course if placed over vapor retarder and beneath the slab-on-grade.
 - 2. Section 311000 "Site Clearing" for site stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements and utilities.
 - 3. Section 329210 "Erosion Prevention and Sediment Control" for preventing erosion and controlling sediment laden runoff for areas disturbed by the earthwork.
 - 4. Section 329300 "Native Exterior Plants Around Bridges" finish grading, including placing and preparing topsoil for lawns and planting.

1.3 DEFINITIONS

- A. Backfill: Soil material or controlled low-strength material used to fill an excavation.
 - 1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
 - 2. Final Backfill: Backfill placed over initial backfill to fill a trench.
- B. Base Course: Aggregate layer placed between the subbase course and surface pavement in a paving system.

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- C. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.
- D. Chemically Stabilized Roadbed: Subgrade layer of roadbed receiving chemical (lime) treatment as means of stabilization.
- E. Drainage Fill: Course of washed granular material supporting slab-on-grade placed to cut off upward capillary flow of pore water.
- F. Excavation: Removal of material encountered to subgrade elevations and the reuse or disposal of materials removed.
- G. Unauthorized excavation consists of removing materials beyond indicated subgrade elevations or dimensions without direction by the Architect. Unauthorized excavation, as well as remedial work directed by the Architect, shall be at the Contractor's expense.
- H. Fill: Soil materials used to raise existing grades.
- I. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- J. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.
- K. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.
- L. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.
- M. "Owner's Property" includes the project limits shown on the plans, unless noted otherwise.

1.4 SUBMITTALS

- A. General: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product Data: For each type of the following manufactured products required:
 - 1. Each type of plastic warning tape.
- C. Test Reports: In addition to test reports required under field quality control, submit the following:
 - 1. Laboratory analysis of each soil material proposed for fill and backfill from on-site and borrow sources.

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2. One optimum moisture-maximum density curve for each soil material.
3. Report of actual unconfined compressive strength and/or results of bearing tests of each stratum tested.

1.5 QUALITY ASSURANCE

- A. Codes and Standards: Perform earthwork complying with requirements of authorities having jurisdiction.
- B. Testing and Inspection Service: Owner will employ a qualified independent geotechnical engineering testing agency to classify proposed on-site and borrow soils to verify that soils comply with specified requirements and to perform required field and laboratory testing.

1.6 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt existing utilities serving facilities occupied by the Owner or others except when permitted in writing by the Owner and the only after acceptable temporary utility services have been provided.
 1. Provide a minimum 72-hours' notice to the Owner and receive written notice to proceed before interrupting any utility.
 2. Protect existing utilities that are to remain.
- B. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shutoff services if lines are active.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: Borrow soil materials will be obtained from on-site locations. These locations will be determined by the Owner and will be located within the 3A Project Boundary.
- B. Satisfactory Soil Materials: ASTM D 2487 soil classification groups CL, CH, GW, GP, GM, SW, SP, and SM; free of rock or gravel larger than 2 inches (50 mm) in any dimension, debris, waste, frozen materials, vegetation and other deleterious matter
- C. Unsatisfactory Soil Materials: ASTM D 2487 soil classification groups GC, SC, ML, MH, OL, OH, and PT.
- D. Backfill and Fill Materials: Satisfactory soil materials.
- E. Subbase and Base Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 95 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.

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- F. Engineered Fill: Subbase or base materials and fill for over-excavated locations.
- G. Bedding Material: Subbase or base materials with 100 percent passing a 1-inch (25-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.
- H. Drainage Fill: Washed, evenly graded mixture of crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch (37.5-mm) sieve and 0 to 5 percent passing a No. 8 (2.36-mm) sieve.
- I. Filtering Material: Evenly graded mixture of natural or crushed gravel, or crushed stone and natural sand; with 100 percent passing a 1 ½ inch (38-mm) sieve and 0 to 5 percent passing a No. 50 (300-µm) sieve.
- J. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

2.2 CHEMICAL STABILIZATION MATERIALS

- A. Cement or lime materials used for stabilization per KYTC Standard Specifications, Section 208 – Chemically Stabilized Roadbed.

2.3 ACCESSORIES

- A. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches (750 mm) deep; colored as follows:
 - 1. Red: Electric.
 - 2. Yellow: Gas, oil, steam, and dangerous materials.
 - 3. Orange: Telephone and other communications.
 - 4. Blue: Water systems.
 - 5. Green: Sewer systems.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth moving operations.
- B. Protect and maintain erosion and sedimentation controls during earth moving operations.

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3.2 DEWATERING

- A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

3.3 EXCAVATION, GENERAL

- A. **Unclassified Excavation:** Excavation is unclassified and includes excavation to required subgrade elevation regardless of the character of materials and obstructions encountered.

3.4 STABILITY OF EXCAVATIONS

- A. Comply with local codes, ordinances, and requirements of authorities having jurisdiction to maintain stable excavations.

3.5 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch (25 mm). If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
 - 1. **Excavations for Footings and Foundations:** Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
 - 2. **Pile Foundations:** Stop excavations 6 to 12 inches (150 to 300 mm) above bottom of pile cap before piles are placed. After piles have been driven, remove loose and displaced material. Excavate to final grade, leaving solid base to receive concrete pile caps.
 - 3. **Excavation for Underground Basin and Mechanical or Electrical Utility Appurtenances:** Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1.2 inch (30 mm). Do not disturb bottom of excavations intended as bearing surfaces.

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and grades.

3.7 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
 - 1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.

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- B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches (300 mm) higher than top of pipe or conduit unless otherwise indicated.
 - 1. Clearance: 6 inches (150mm) each side of pipe or conduit, or as indicated.
- C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade to avoid point loading.
 - 1. As shown on the details in the plans.
 - 2. For pipes and conduit less than 6 inches (150 mm) in nominal diameter and flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
 - 3. For pipes and conduit 6 inches (150 mm) or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe or conduit circumference. Fill depressions with tamped sand backfill. Where so indicated in the drawings, install 6 inches of bedding course (150mm) in bottom of trench to support pipes and conduit.
 - 4. Where encountering rock or another unyielding bearing surface, carry trench excavation 6 inches (150mm) below invert elevation to receive bedding course.

3.8 CHEMICAL STABILIZATION

- A. Provide chemical stabilization for specified areas of roadbed per pavement details and KYTC Standard Specifications Section 208 – Chemically Stabilized Roadbed.

3.9 APPROVAL OF SUBGRADE

- A. Notify Architect when excavations have reached required subgrade.
- B. If Architect determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
 - 1. Unforeseen additional excavation and replacement material will be paid according to the Contract provisions for changes in the work.
- C. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

3.10 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi (17.2 MPa), may be used when approved by Architect.

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1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Architect.

3.11 STORAGE OF SOIL MATERIALS

- A. Stockpile excavated materials acceptable for backfill and fill soil materials, including acceptable borrow materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water to sediment control facilities. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.
2. Topsoil shall be stockpiled in the designated areas shown on the drawings. If there is excess topsoil it shall be left in place, graded to conform to the existing contours adjoining the stockpiles or as directed by the Architect.

3.12 BACKFILL

- A. Place and compact backfill in excavations promptly, but not before completing the following:
 1. Acceptance of construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.
 2. Surveying locations of underground utilities for Record Documents.
 3. Testing and inspecting underground utilities.
 4. Removing concrete formwork.
 5. Removing trash and debris.
 6. Removing temporary shoring and bracing, and sheeting.
 7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

3.13 UTILITY TRENCH BACKFILL

- A. Place and compact bedding course on rock and other unyielding bearing surfaces and to fill unauthorized excavations. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- B. Concrete backfill trenches that carry below or pass under footings and that are excavated within 18 inches (450 mm) of footings. Place concrete to level of bottom of footings.
- C. Provide 4 inch (100 mm) thick concrete base slab support for piping or conduit less than 30 inches (750 mm) below surface of roadways. After installation and testing, completely encase piping or conduit in a minimum of 4 inches (100 mm) of concrete before backfilling or placing roadway subbase
- D. Place and compact initial backfill of satisfactory soil material or subbase material, free of particles larger than 1 inch (25 mm), to a height of 12 inches (300 mm) over the utility pipe or conduit.

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1. Carefully compact material under pipe haunches and bring backfill evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of utility system.
 - E. Coordinate backfilling with utilities testing.
 - F. Fill voids with approved backfill materials as shoring and bracing, and sheeting is removed.
 - G. Place and compact final backfill of satisfactory soil to final subgrade elevation.
 - H. Install warning tape directly above utilities, 12 inches (300 mm) below finished grade, except 6 inches (150 mm) below subgrade under pavements and slabs.
- 3.14 SUBSURFACE DRAINAGE BACKFILL
- A. Subsurface Drain: As shown on the plans.
 - B. Drainage Backfill: Place and compact drainage backfill of filtering material over subsurface drain, in width indicated, to within 12 inches (300 mm) of final subgrade.
 - C. Impervious Fill: Place and compact impervious fill material over drainage backfill to final subgrade.
- 3.15 FILL
- A. Preparation: Remove vegetation, topsoil, debris, wet and unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placing fills.
 1. Plow strip, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing surface.
 - B. When subgrade or existing ground surface to receive fill has a density less than that required for fill, break up ground surface to depth required, pulverize, moisture-condition or aerate soil and recompact to required density.
 - C. Place fill material in layers to required elevations for each location listed below.
 1. Under grass, use satisfactory excavated or borrow soil material.
 2. Under walks and pavements, use subbase or base material, or satisfactory excavated or borrow soil material.
 3. Under steps and ramps, use subbase material.
 4. Under building slabs, use drainage fill material or as shown on the plans.
 5. Under footings and foundations, use engineered fill.
 - D. MSD has an excess of waste material from the construction of improvements to the treatment plant that they are going to stockpile on their property. This waste material has been classified as being suitable for use in constructing the fill for the bridge approaches. The contractor shall

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verify to the owner that this material is suitable for its intended use as soon as the material is available to review. The contractor shall not begin operations to install the fill material until it has been approved by a geotechnical engineer.

3.16 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
 - 1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
 - 2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that is too wet to compact to specified dry unit weight.

3.17 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than 8 inches (200 mm) in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches (100 mm) in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- C. Percentage of Maximum Dry Density Requirements: Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698 (Standard Proctor):
 - 1. Under structures, building slabs, steps, and pavements, compact the top 12 inches (300 mm) below subgrade to at least at 98 percent of soil's maximum dry density and each layer of backfill or fill material at 95 percent maximum dry density.
 - 2. Under walkways, compact the top 12 inches (300 mm) below subgrade and each layer of backfill or fill soil material at 95 percent maximum dry density.
 - 3. Under lawn or unpaved areas, compact the top 6 inches (150 mm) below subgrade and compact each layer of backfill or fill soil material at 90 percent maximum dry density.

3.18 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
 - 1. Provide a smooth transition between adjacent existing grades and new grades.
 - 2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:

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1. Lawn or Unpaved Areas: Plus or minus 1-inch (25mm).
 2. Walks: Plus or minus 1/2 inch (13 mm).
 3. Pavements: Plus or minus 1/2 inch (13 mm).
- C. Grading inside Building Lines: Finish subgrade to a tolerance of ½ inch (13mm) when tested with a 10-foot (3-m) straightedge.
- 3.19 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS
- A. Under pavements and walks, place subbase course material on prepared subgrades. Place base course material over subbase for pavements.
1. Compact subbase and base courses at optimum moisture content to required grades, lines, cross sections and thickness to not less than 98 percent of its maximum modified Proctor (ASTM D 1556) dry density.
 2. Shape subbase and base to required crown elevations and cross-slope grades.
 3. When thickness of compacted subbase or base course is 6 inches (150 mm) or less, place materials in a single layer.
 4. When thickness of compacted subbase or base course exceeds 6 inches (150 mm), place materials in equal layers, with no layer more than 6 inches (150 mm) thick or less than 3 inches (75 mm) thick when compacted.
- 3.20 DRAINAGE FILL
- A. Under slabs-on-grade, place drainage fill course on prepared subgrade.
1. Compact drainage fill to required cross sections and thickness.
 2. When compacted thickness of drainage fill is 6 inches (150 mm) or less, place materials in a single layer.
 3. When compacted thickness of drainage fill exceeds 6 inches (150 mm) thick place materials in equal layers, with no layer more than 6 inches (150 mm) thick nor less than 3 inches (75 mm) thick when compacted.
- 3.21 FIELD QUALITY CONTROL
- A. Testing Agency Services: Allow testing agency to inspect and test each subgrade and each fill or backfill layer. Do not proceed until test results for previously completed work verify compliance with requirements. The following lists the tentative testing procedures:
1. Perform field in-place density tests according to ASTM D 1556 (sand cone method), ASTM D 2167 (rubber balloon method), or ASTM D 2937 (drive cylinder method), as applicable.
 - a. Field in-place density tests may also be performed by the nuclear method according to ASTM D 2922, provided that calibration curves are periodically checked and adjusted to correlate to tests performed using ASTM D 1556. With each density calibration check, check the calibration curves furnished with the moisture gages according to ASTM D 3017.

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- b. When field in-place density tests are performed using nuclear methods, make calibration checks of both density and moisture gages at beginning of work, on each different type of material encountered, and at intervals as directed by the Architect.
 2. Footing Subgrade: At footing subgrades, perform at least one test of each soil stratum to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of each subgrade with related tested strata when acceptable to the Architect.
 3. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, perform at least one field in-place density test for every 2000 sq. ft. (186 sq. m) or less of paved area or building slab, but in no case fewer than three tests.
 4. Foundation Wall Backfill: In each compacted backfill layer, perform at least one field in-place density test for each 100 feet (30 m) or less of wall length, but no fewer than two tests along a wall face.
 5. Trench Backfill: In each compacted initial and final backfill layer, perform at least one field in-place density test for each 150 feet (45 m) or less of trench, but no fewer than two tests.
 - B. When testing agency reports that subgrades, fills, or backfills are below specified density, scarify and moisten or aerate, or remove and replace soil to the depth required, recompact and retest until required density is obtained.
 - C. Proof Rolling Subgrade: Material shall be proof rolled with a pneumatic tire roller having an effective weight of 50 tons (45.5 Mg). Alternate proof rollers, acceptable to the Architect / Owner, may be used in lieu of a 50 ton (45.5 Mg) pneumatic tired roller provided the weight per tire and tire pressure is maintained so that a minimum of 1315 pounds per inch (9.067 KN/mm) width of tire is maintained. The roller shall be operated at a speed of not more than five miles per hour (8 km/hr.). The designated areas to be proof rolled shall have two or more passes and the entire area shall be systematically covered with the proof rolling. During the proof rolling and after the proof rolling is completed, the area shall be checked for unstable areas or soft spots disclosed by the operation of the proof roller. These unstable areas or soft spots shall be corrected prior to placement of the overlying lifts of material. The Contractor may propose an alternate approach for small areas that are impractical to roll with the proof roller.
- 3.22 PROTECTION
- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
 - B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
 1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and recompact.

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- C. Settling: Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
 - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.23 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Surplus satisfactory soil and unsatisfactory soil and waste material will be disposed of on the site. All clearing and grubbing waste material and debris will be disposed of on the site. These locations will be determined by the Owner and will be located within the 3A Project boundary.
- B. Transport surplus satisfactory soil to designated storage areas on Owner's property. Stockpile or spread soil as directed by Architect.
 - 1. Remove waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

3.24 USE OF EXPLOSIVES

- A. The use of explosives is allowed. The contractor shall also conform to all local and public agency restrictions for performing any blasting.
- B. Per the Kentucky Department of Highways Standard Specification for Road and Bridge Construction, Section 107, Legal Relations and Responsibility to Public, Subsection 107.11, Use of Explosives and Section 112, Maintenance and Control of Traffic During Construction, Sub Section 112.03.09, Blasting.
- C. Where identified on the plans there are areas of required excavations over 5 feet in depth where geotechnical report predicts shallow depths to bedrock which should be presplit prior to excavation. The intent for these areas is to control the final cut conditions, limit disturbed area, and establish a vertical limestone face which will blend with existing adjacent areas of natural limestone outcrops. The contractor shall presplit these areas according to KYTC Specifications Section 204.03.04 to achieve a relatively smooth rock surface which is free of all loose or crushed pieces of bedrock. Areas of shallow overburden above rock faces shall be graded and restored per plan grade and typical section detail.

END OF SECTION 312000

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SECTION 312001 - EARTH MOVING FOR BRIDGES AND RETAINING WALLS

PART 1 - GENERAL

1.1 STANDARDS

- A. Follow the requirements of the Kentucky Transportation Cabinet Standard Specifications for Road and Bridge Construction, current edition, Division and Section 603.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Follow the requirements of the Kentucky Transportation Cabinet Standard Specifications for Road and Bridge Construction, current edition, Division and Section 603.

PART 3 - EXECUTION

3.1 PREPARATION, STORAGE, AND EXCAVATION

- A. Follow the requirements of the Kentucky Transportation Cabinet Standard Specifications for Road and Bridge Construction, current edition, Division and Section 603.

END OF SECTION 312001

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SECTION 316200 – ROCK ANCHORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Rock anchors.
- 2. Rock probes.
- 3. Grout.

- B. Related Sections:

- 1. Section 014000 "Quality Requirements" for independent testing agency procedures and administrative requirements.

1.3 DEFINITIONS

- A. Rock Anchor: A rock anchor consists of a strand tendon with an anchorage assembly placed in a cored or drilled hole, and then grouted and stressed.
- B. Rock Probe: add definition.
- C. Lock-off Load: Load maintained on the jacks while the anchor head or anchor nuts on the rock anchor are permanently set.

1.4 PERFORMANCE REQUIREMENTS

- A. Add if any.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Rock Anchor Shop Drawings must include:
 - 1. Details and specifications for the anchorage system and rock anchors.
 - 2. Details for the transition between the corrugated plastic sheathing and the anchorage assembly.

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3. If shims are used during lock-off, shim thickness and supporting calculations.
4. Construction schedule and sequence of installing and grouting.
5. Encapsulation details.
6. Repair procedure for damaged sheathing.
7. Drilling methods and equipment, including:
 - a. Drilled hole diameter.
 - b. Equipment space requirements.
8. Grout mix design and testing procedures.
9. Grout placement equipment and procedures, including minimum required cure time.
10. Details for providing the bonded and unbonded length. If packers or other similar devices are to be used, include the type.
11. Testing equipment, including:
 - a. Jacking frame and appurtenant bracing.
 - b. Method and equipment for measure movement during testing.

C. Rock Anchor Test Data for each rock anchor must include:

1. Key personnel.
2. Test loading equipment.
3. Anchor location.
4. Time and date of:
 - a. Drilling
 - b. Installation
 - c. Grouting
 - d. Testing
5. Hole diameter and depth.
6. Drilling method.
7. Rock classification and description.
8. Bonded and unbonded length.
9. Quantity of ground water encountered within the bonded length.
10. Grout quantity and pressure used within the bonded length.
11. Anchor end or nail head movement at each load increment or at each time increment during the load hold period.

1.6 INFORMATIONAL SUBMITTALS

- A. Jack Calibration: Certified calibration chart for each jack and its gage.
- B. Corrosion-inhibiting Grease: Test sample from the lot to be used and test data showing compliance with the specifications for Strand Coating and Encapsulation.

1.7 QUALITY ASSURANCE FOR LOAD TESTING

- A. The jacking equipment and the movement measuring system must be stable during all phases of loading.
- B. Do not unload or reposition the test equipment during load testing.
- C. Jacking Equipment and Calibration:

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1. Apply the test loads using a hydraulic jack supported by a reaction frame that can support the test equipment without excessive deformation.
 2. Use a calibrated pressure gage or a load cell to determine the magnitude of applied test loads.
 3. The pressure gage must have an accurately reading, clearly visible dial or display. Dial gages must be graduated in 100 psi increments or less.
 4. Calibrate each jack and its gage as a unit, with the cylinder extension in the approximate position it will have at the final jacking force. Each jack used must be calibrated by an authorized laboratory within 6 months of use and after each repair.
 5. The load cell must be calibrated and have an indicator capable of measuring the maximum test load. The load cell range must be such that the lower 10 percent of the manufacturer's rated capacity is not used in determining the jacking force.
- D. The equipment for measuring the movement at the anchor end must be accurate to 0.001 inch and have enough capacity to complete the test without being reset.
- E. Procedure:
1. At each load increment, including the ending alignment load, measure the movement at the anchor end relative to an independent, fixed reference point. Record the movements to the nearest 0.001 inch.
 2. Maintain each test load within 5 percent of the specified load throughout each hold period.
- 1.8 DELIVERY, STORAGE, AND HANDLING
- A. Store materials to permit easy access for inspection and identification. Protect steel members and packaged materials from corrosion and deterioration. Repair or replace damaged materials as directed.
 - B. Store anchor assemblies in a protected place in sealed containers with manufacturer's labels intact.

PART 2 - PRODUCTS

- 2.1 STRAND TENDON
- A. Uncoated strand must comply with ASTM A 416/A 416M.
 - B. Epoxy-coated strand must comply with ASTM A 882/A 882M, grit impregnated coating, including Annex A1.
- 2.2 STEEL
- A. The anchorage enclosure and the steel tube and bearing plate of the anchorage assembly must be galvanized steel complying with Section 051200.

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- B. The permanent bearing plate must effectively distribute the factored test load uniformly to the concrete such that:
 - 1. Concrete bearing stress does not exceed 2,400 psi.
 - 2. Bending stress of the plate does not exceed:
 - a. 0.90 of the yield strength for steel.
 - b. 0.55 of the yield strength for cast steel or cast iron.

2.3 SHEATHING

- A. Smooth plastic sheathing for encapsulating individual strands of strand tendons must be HDPE or polypropylene and must have a minimum wall thickness of 40 mils.
- B. Corrugated plastic sheathing:
 - 1. Corrugated plastic sheathing must be PVC or HDPE.
 - 2. PVC corrugated sheathing must have a nominal wall thickness of 40 mils.
 - 3. HDPE corrugated sheathing with an outside diameter of 3 inches or greater must have a nominal wall thickness of 60 mils. HDPE corrugated sheathing with an outside diameter of less than 3 inches must have a nominal wall thickness of 40 mils.
 - 4. The corrugation width, the distance between corrugations, and the corrugation height of corrugated plastic sheathing must be approximately equal
- C. HDPE sheathing must have a density of from 940 to 960 kg/m³ when measured under ASTM D 792.
- D. Polypropylene sheathing must have a density of from 900 to 910 kg/m³ when measured under ASTM D 792.
- E. PVC sheathing must comply with ASTM D 1784, Class 13464-B.
- F. Smooth and corrugated sheathing, including joints, must be:
 - 1. Strong enough to prevent damage during construction.
 - 2. Watertight.
 - 3. Chemically stable without embrittlement or softening.
 - 4. Nonreactive with:
 - a. Concrete.
 - b. Steel.
 - c. Corrosion-inhibiting grease, if used.

2.4 STRAND COATING AND ENCAPSULATION

- A. Within the unbonded length of strand tendons, fully coat each individual strand with corrosion-inhibiting grease and encapsulate it with a smooth HDPE or polypropylene sheath.
- B. Hot melt extrude or shop apply the sheath onto the strand using a method that ensures all spaces between the sheath, strand, and strand wires are filled with corrosion-inhibiting grease.
- C. The corrosion-inhibiting grease must:

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1. Fill all space between the strand wires.
2. Encapsulate the strand, giving an encasement diameter at least 5 mils greater than the diameter of the bare strand.
3. Provide a continuous, nonbrittle film of corrosion protection to the prestressing steel.
4. Provide lubrication between the strand and the sheathing.
5. Resist flow from the sheathing.
6. Be chemically stable and nonreactive with the prestressing steel, sheathing material, and concrete.
7. Be organic.
8. Have appropriate polar, moisture-displacing, and corrosion-inhibiting additives.
9. Have the physical properties shown in Table 1 of *Specification for Unbonded Single Strand Tendons* published by the Post-Tensioning Institute.

2.5 GROUT

- A. Grout must consist of cement and water and may contain an admixture if authorized.
- B. Cement must comply with Section 033000.
- C. Water must comply with Section 033000.
- D. Admixtures must comply with Section 033000, except admixtures must not contain chloride ions in excess of 0.25 percent by weight and may be dispensed in solid form.
- E. Mix the grout as follows:
 1. Add water to the mixer followed by cement and any admixture.
 2. Mix the grout with mechanical mixing equipment that produces a uniform and thoroughly mixed grout.
 3. Do not exceed 5 gallons of water per 94 lb of cement. Retempering of grout is not allowed.
 4. Agitate the grout continuously until the grout is pumped.
- F. The efflux time of grout immediately after mixing must be at least 11 seconds.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify, with Engineer present, elevations of concrete-bearing surfaces and locations of rock anchors and anchorage assemblies for compliance with requirements.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 GENERAL

- A. Rock anchor installation must comply with the manufacturer's instruction unless otherwise specified.

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- B. Determine the bonded length necessary to comply with the specified acceptance criteria.
- C. Sheath the tendons in the unbonded length with smooth plastic sheathing that extends into the steel tube of the permanent anchorage assembly. Sheath the tendons full length with corrugated plastic sheathing.
- D. The transition between the corrugated plastic sheathing and the anchorage assembly must allow stressing to the maximum test load without evidence of distress in the corrugated plastic sheathing.
- E. Select a rock anchor installation method that achieves the loadings specified.
- F. Drill the holes for rock anchors in the foundation material deep enough to provide the necessary bond length beyond the minimum unbonded length shown.
- G. The diameter of the drilled hole must be large enough to provide a minimum grout cover of 1 inch over the corrugated sheathing for the full length of the tendon.
- H. Before installing a rock anchor, repair or replace any damaged portions of the sheathing.
- I. Place centralizers at 10-foot maximum intervals for the full length of the tendon, with the uppermost centralizer located 2 feet from the end of the steel tube and the deepest centralizer located 2 feet from the end of the anchor.
- J. PregROUT each tendon at least 48 hours before placing the tendon in the drilled hole.
- K. At each grouting stage, inject the grout at the low end of the void to be filled. Place the grout using grout tubes. Do not place grout in the unbonded length under pressure. Record the quantity of grout and the grout pressures.
- L. After initial grouting, the anchor must remain undisturbed until the grout is strong enough to provide anchorage during load testing.
- M. Protect the anchorage assembly against rust, corrosion, and physical damage until the enclosure is grouted or the assembly is encased in concrete.
- N. Water or grout from rock anchor construction must not:
 - 1. Flow into creek?
 - 2. Flow into landscaping, gutters, or other drainage facilities.
- O. Do not use an excessive quantity of water when drilling and installing rock anchors.

3.3 STRAND TENDONS

- A. Separate the individual strands of strand tendons within the bonded length using spacers such that the entire surface of each strand is bonded in the grout. The spacers must be:
 - 1. Spaced at 5 feet maximum.
 - 2. Made of plastic.
 - 3. Strong enough to support the individual strands during construction activities.

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- B. PregROUT the corrugated sheathing a minimum length of 2 feet before inserting the strand tendon in the hole.
- C. After inserting the strand tendon and before placing the initial grout in the hole, inject grout into the corrugated sheathing to the limits shown.

3.4 DRILLING

- A. Drilling equipment must produce straight, clean holes.
- B. Use the rotary or rotary percussion drilling method to drill rock anchor in the foundation material.
- C. At locations where caving is anticipated, keep enough casing and auger lengths on the job site to maintain uninterrupted anchor or nail installation.
- D. At locations where hard drilling conditions, such as rock, cobbles, boulders, or obstructions, are anticipated, keep a down-hole pneumatic hammer drill rig and drill bit available on the job site for drilling holes.
- E. Clean the holes to remove material from drilling activities.

3.5 INSTALLATION

- A. Before inserting each rock anchor into a drilled hole, clean the anchor of oil, grease, dirt, and other extraneous substances and repair or replace any damaged sheathing.
- B. There must be no evidence of distress in the plastic sheathing or crushing of the grout within the pregrouted sheathing.
- C. Do not insert an anchor into a hole until the hole has been inspected by the Engineer.
- D. Install the anchor in the drilled hole promptly so that caving or deterioration of the hole does not occur.
- E. If the anchor cannot be inserted into a drilled hole to the required depth without difficulty, remove the anchor and clean or redrill the hole. Do not force or drive a partially inserted anchor into a drilled hole. Partially inserted anchors are rejected.
- F. For open-hole drilling methods, keep hole-cleaning tools on the job site. The tools must be suitable for cleaning drilled holes along their full length just before inserting the anchor.

3.6 LOCK-OFF

- A. After a successful rock anchor test, tension the anchor and lock it off at the lock-off load shown on the plans.
- B. Lock off strand tendons as follows:

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1. Stress the tendon to the maximum test load.
 2. Fully set the permanent wedges in the anchor head.
 3. Remove the shims or use other appropriate means to achieve the lock-off load shown.
- C. Immediately after lock-off, perform a lift-off test to verify that the lock-off load has been attained. If necessary, adjust the shim thickness to achieve the lock-off load.
- D. After lock-off, place grout to the secondary grout level shown. At least 24 hours after the secondary grout has set, fill the remaining void in the steel tube and bearing plate with grout. Maintain a minimum grout head of 2 feet until the grout has set.
- E. If a grouted anchorage enclosure is shown, install the enclosure as follows:
1. Grout the steel tube.
 2. Clean the bearing plate surface.
 3. Place the sealant.
 4. Bolt the anchorage enclosure in place.
 5. Fill the void in the anchorage enclosure with grout.
 6. Clean and seal any holes in the top of the anchorage enclosure used for grout placement. Use a nonsag polysulfide or polyurethane sealing compound that complies with ASTM C 920.

3.7 LOAD TESTING

- A. The Contract describes which rock anchors are to be performance tested. Proof test all rock anchors that are not performance tested.
- B. Perform load testing against the completed structural element shown. Do not test directly against the soil.
- C. Do not stress against the concrete until it has attained a compressive strength of at least 2,880 psi or has cured for at least 7 days.
- D. Bearing pads must be a minimum of 1 foot away from the edges of the drilled hole.
- E. Procedure
1. Conduct the performance and proof tests as follows:
 - a. Incrementally load and unload the anchor as shown in the following table:

Loading Schedules

| Performance Test | | Proof Test | |
|------------------|---------------------|----------------------|---------------------|
| Load increment | Hold time (minutes) | Load increment | Hold time (minutes) |
| AL | Until stable | AL | Until stable |
| 0.20FTL | 1-2 | 0.20FTL | 1-2 |
| AL | Until stable | 0.40FTL | 1-2 |
| 0.20FTL | 1-2 | 0.60FTL | 1-2 |
| 0.40FTL | 1-2 | 0.80FTL | 1-2 |
| AL | Until stable | 1.00FTL ^a | 10 or 60 |

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| | | | |
|----------------------|--------------|----|--------------|
| 0.20FTL | 1-2 | AL | Until stable |
| 0.40FTL | 1-2 | -- | -- |
| 0.60FTL | 1-2 | -- | -- |
| AL | Until stable | -- | -- |
| 0.20FTL | 1-2 | -- | -- |
| 0.40FTL | 1-2 | -- | -- |
| 0.60FTL | 1-2 | -- | -- |
| 0.80FTL | 1-2 | -- | -- |
| AL | Until stable | -- | -- |
| 0.20FTL | 1-2 | -- | -- |
| 0.40FTL | 1-2 | -- | -- |
| 0.60FTL | 1-2 | -- | -- |
| 0.80FTL | 1-2 | -- | -- |
| 1.00FTL ^a | 10 or 60 | -- | -- |
| AL | Until stable | -- | -- |

Note: FTL = factored test load shown. AL = alignment load, 0.10FTL.

^aMaximum test load

- b. Apply each load increment in less than 1 minute and hold it for the length of time shown in the table titled "Loading Schedules."
- c. Measure and record the applied test load and the anchor end movement at each load increment.
- d. When applying the maximum test load:
 - 1) Hold the load constant for 10 minutes.
 - 2) Start the observation period for the load hold when the pump starts to apply the last load increment.
 - 3) Measure and record the anchor end movement at 1, 2, 3, 4, 5, 6, and 10 minutes.
- e. If the movement measured from 1 to 10 minutes is greater than 0.04 inch:
 - 1) Hold the load constant for an additional 50 minutes.
 - 2) Measure and record the anchor end movement at 15, 20, 25, 30, 45, and 60 minutes.
 - 3) Plot a creep curve as a function of the logarithm of time, showing the anchor end movement from 6 to 60 minutes.
- f. Reduce the load to the ending alignment load and record the residual movement.

F. Acceptance Criteria – A performance- or proof-tested rock anchor is acceptable if:

- 1. Total measured movement at the maximum test load minus the measured residual movement at the ending alignment load exceeds 80 percent of the theoretical elastic elongation of the sum of the unbonded length and the jacking length.
- 2. Creep movement complies with one of the following:
 - a. For a 10-minute load hold, the creep movement measured from 1 to 10 minutes is less than 0.04 inch.
 - b. For a 60-minute load hold, the creep movement measured from 6 to 60 minutes is less than 0.08 inch and the creep rate is linear or decreasing in time logarithmic scale from the 6- to the 60-minute reading.
- 3. If a rock anchor fails to comply with the acceptance criteria, redesign or replace the rock anchor. Do not retest a rock anchor unless you post-grout the anchor bond length after the unacceptable test.

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- G. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

3.8 REPAIRS AND PROTECTION

- A. Protect the strand tendons against physical damage and rust or other results of corrosion at all times, from manufacture to grouting.
- B. Before installing a rock anchor, repair or replace any damaged portions of the sheathing.

END OF SECTION 316200

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SECTION 316216 – STEEL PILES

PART 1 - GENERAL

1.1 STANDARDS

- A. Follow the requirements of the Kentucky Transportation Cabinet Standard Specifications for Road and Bridge Construction, current edition, Division and Section 603.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Follow the requirements of the Kentucky Transportation Cabinet Standard Specifications for Road and Bridge Construction, current edition, Division and Section 603.

PART 3 - EXECUTION

3.1 PREPARATION, STORAGE, AND EXCAVATION

- A. Follow the requirements of the Kentucky Transportation Cabinet Standard Specifications for Road and Bridge Construction, current edition, Division and Section 603.

END OF SECTION 316216

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SECTION 321216 – HOT-MIX ASPHALT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Hot-mix asphalt patching.
- 2. Hot-mix asphalt paving.
- 3. Chip-Seal asphalt surfacing (asphalt curing seal and seal aggregate)

- B. Related Requirements:

- 1. Section 312000 "Earth Moving" for subgrade preparation, fill material, unbound-aggregate subbase and base courses, and aggregate pavement shoulders.

1.3 SYSTEM DESCRIPTION

- A. Provide hot-mix asphalt pavement according to the materials, workmanship, and other applicable requirements of the Kentucky Transportation Cabinet (KYTC) Standard Specifications for Road and Bridge Construction.

- 1. Standard Specification: As indicated.
- 2. Measurement and payment provision and safety program submittals included in standard specification do not apply to this Section.

1.4 SUBMITTALS

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

- 1. Include technical data and tested physical and performance properties.
- 2. Job-Mix Designs: For each job mix proposed for the Work.

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

- C. Material Certificates: Certificates signed by manufacturers certifying that each material complies with requirements.

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- D. Material Test Reports: For each paving material, by a qualified testing agency. Interpret test results for compliance of materials with requirements indicated.
- E. Mockups: Provide no less than four (4) mockups of the chip-seal asphalt pavement for review by owner and owner's representative. Mockups shall be a minimum of six feet (6') wide, by twelve feet (12') long and shall consistently reflect finished surface condition.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who has complete hot-mix asphalt paving similar in material, design, and extent to that indicated for this project and with a record of successful in-service performance.
- B. Manufacturer Qualifications: Engage a firm experienced in manufacturing hot-mix asphalt similar to that indicated for this Project and with a record of successful in-service performance.
 - 1. Firm shall be a registered and approved paving mix manufacturer with authorities having jurisdiction or Kentucky Transportation Cabinet.
- C. Asphalt Paving Publication: Comply with AI's "The Asphalt Handbook", except where more stringent requirements are indicated.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, or if the applicable requirements in Section 403 of the Kentucky Transportation Cabinet Standard Specifications for Road and Bridge Construction are not met.
- B. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F (4 deg C) for oil-based materials, 50 deg F (10 deg C) for water-based materials, and not exceeding 95 deg F (35 deg C).

PART 2 - PRODUCTS

2.1 AGGREGATES

- A. General: Per the requirements of the Kentucky Transportation Cabinet Standard Specification for fine and course aggregates
- B. Mineral Filler: Per the requirements of the Kentucky Transportation Cabinet Standard Specifications.

2.2 ASPHALT MATERIALS

- A. Per the requirements of the Kentucky Transportation Cabinet Standard Specifications for Road and Bridge Construction, Section 403, Production and Placement of Asphalt Mixtures.

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- B. Water: Potable.

2.3 AUXILIARY MATERIALS

- A. Herbicide: Commercial chemical for weed control, registered by the EPA. Provide in granular, liquid, or wettable powder form.
- B. Pavement-Marking Paint: See Section 321723 "Pavement Markings".

2.4 MIXES

- A. Hot-Mix Asphalt: Provide dense, hot-laid, hot-mix asphalt plant Per the requirements of the Kentucky Transportation Cabinet Standard Specification:
 - 1. Base Course: KYTC Asphalt Class 2 Base, 1.00D, PG64-22.
 - 2. Surface Course: KYTC Asphalt Class 2 Surface, 0.50D, PG64-22.
 - 3. Chip Seal Course: KYTC Asphalt Curing Seal (RS2 Asphalt curing seal) and Seal Aggregate mixture (Coarse Aggregate Gradation size No. 8 or size No. 9-M- or clean aggregate, evenly graded, between 3/8" – 3/16" in size).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that subgrade is dry and in suitable condition to begin paving.
- B. Proof Rolling Subgrade: Subgrade shall be proof rolled with a pneumatic tire roller having an effective weight of 50 tons (45.5 Mg). Alternate proof rollers, acceptable to the Architect/ Owner, may be used in lieu of a 50 ton (45.5 Mg) pneumatic tired roller provided the weight per tire and tire pressure is maintained so that a minimum of 1315 pounds per inch (9.067 KN/mm) width of tire is maintained. The roller shall be operated at a speed of not more than five miles per hour (8 km/hr.). The designated areas to be proof rolled shall have two or more passes and the entire area shall be systematically covered with the proof rolling. During the proof rolling and after the proof rolling is completed, the area shall be checked for unstable areas or soft spots disclosed by the operation of the proof roller. These unstable areas or soft spots shall be corrected prior to placement of the overlying lifts of material. The Contractor may propose an alternate approach for small areas that are impractical to roll with the proof roller.
- C. Notify Architect in writing of any unsatisfactory conditions. Do not begin paving installation until these conditions have been satisfactorily corrected..

3.2 SURFACE PREPARATION

- A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.

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1. Sweep loose granular particles from surface of unbound aggregate base course. Do not dislodge or disturb aggregate embedded in compacted surface of base course.
- B. Herbicide Treatment: Apply herbicide according to manufacturer's recommended rates and written application instructions. Apply to dry, prepared subgrade or surface of compacted-aggregate base before applying paving materials.

3.3 PLACING HOT-MIX ASPHALT

- A. Per the Kentucky Transportation Cabinet Standard Specifications for Road and Bridge Construction, Section 403, Production and Placement of Asphalt Mixtures.
 1. Place hot-mix asphalt binder and surface courses in single lifts.
 2. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes, unless otherwise indicated.
 3. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.
- B. Place paving in consecutive strips not less than 10 feet (3 m) wide unless infill edge strips of a lesser width are required.
 1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete asphalt base course for a section before placing asphalt surface course.
- C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.4 JOINTS

- A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.
 1. Clean contact surfaces and apply tack coat to joints.
- B. Per the Kentucky Transportation Cabinet Standard Specifications for Road and Bridge Construction, Section 403, Production and Placement of Asphalt Mixtures.

3.5 COMPACTION

- A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.
 1. Complete compaction before mix temperature cools to 185 deg F (85 deg C).

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- B. Per the Kentucky Transportation Cabinet Standard Specifications for Road and Bridge Construction, Section 403, Production and Placement of Asphalt Mixtures.
- C. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.
- D. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.
- E. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
- F. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.6 INSTALLATION TOLERANCES

- A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:
 - 1. Base Course: Plus 1/2 inch (13 mm), no minus.
 - 2. Surface Course: Plus 1/4 inch (6 mm), no minus.
- B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot (3-m) straightedge applied transversely or longitudinally to paved areas:
 - 1. Base Course: 1/4 inch (6 mm).
 - 2. Surface Course: 1/8 inch (3 mm).
 - 3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch (6 mm).

3.7 FIELD QUALITY CONTROL

- A. Testing Agency: Contractor will engage a qualified independent testing agency to perform tests and inspections.
 - 1. Testing agency will conduct and interpret tests and state in each report whether tested work complies with or deviates from specified requirements.
- B. Additional testing at Contractor's expense will be performed to determine compliance of corrected Work with specified requirements.
- C. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549.

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- D. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.
- E. In-Place Density: Owner will take cores of compacted pavement according to ASTM D 979.
 - 1. In-place density of compacted pavement will be determined by testing core samples taken by owner according to ASTM D 1188 or ASTM D 2726.
 - a. One core sample will be taken for every 1000 sq. yd. (836 sq. m) or less of installed pavement, with no fewer than three cores taken.
- F. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.8 CHIP SEAL ASPHALT SURFACING

- A. Refer to Plan Details and construct in accordance with KYTC Standard Specifications
- B. Provide series of mockups as specified and requested by owner's representative, prior to installation of any final areas of chip-seal asphalt surfacing.

END OF SECTION 321216

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SECTION 321313 – PORTLAND CEMENT CONCRETE PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Curbs and gutters.
- 2. Sidewalks.
- 3. Concrete pavement for park roads and trails.
- 4. Site concrete on grade.

B. Related Sections:

- 1. Section 033000 "Cast-in-Place Concrete for general building applications of concrete.
- 2. Section 312000 "Earth Moving" for subgrade preparation, grading and subbase course, and proof rolling.
- 3. Section 321373 "Concrete Paving Joint Sealants" for joint sealants in expansion and contraction joints within concrete paving and in joints between concrete paving and asphalt paving or adjacent construction.
- 4. Section 321723 "Pavement Markings" for pavement striping and markings.

1.3 SUBMITTALS

- A. Product data for proprietary materials and items, including reinforcement and forming accessories, synthetic fiber reinforcement, admixtures, joint systems, curing compounds, and others if requested by Architect.
- B. Design mixes for each class of concrete. Include revised mix proportions when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.
- C. Laboratory test reports for evaluation of concrete materials and mix design tests.
- D. Material certificates in lieu of material laboratory test reports when permitted by Architect. Material certificates shall be signed by manufacturer and Contractor certifying that each material item complies with or exceeds requirements. Provide certification from admixture manufacturers that chloride content complies with requirements.

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1.4 QUALITY ASSURANCE

- A. Concrete Standards: Comply with provisions of the following standards, except where more stringent requirements are indicated.
 - 1. American Concrete Institute (ACI) 301, "Specifications for Structural Concrete for Buildings."
 - 2. ACI 318, "Building Code Requirements for Reinforced Concrete."
 - 3. Concrete Reinforcing Steel Institute (CRSI) "Manual of Standard Practice."
- B. Concrete Testing Service: The Owner will engage a qualified independent testing agency to perform materials evaluation tests and to design concrete mixes. The Contractor shall coordinate with the testing service to have samples obtained.

PART 2 - PRODUCTS

2.1 FORMS

- A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.
 - 1. Use flexible or uniformly curved forms for curves with a radius of 100 feet (30.5 m) or less.
- B. Form-Release Agent: Provide commercial formulation form-release agent with a maximum of 350 g/L volatile organic compounds (VOCs) that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.2 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, Type I
 - 1. Use one brand of cement throughout the Project unless otherwise acceptable to Architect.
- B. Fly Ash: ASTM C 618, Class C or Class F.
- C. Normal-Weight Aggregates: ASTM C 33, Class 4 and as follows:
 - 1. Maximum Coarse-Aggregate Size: 1-1/2 inches (38 mm).
 - 2. Do not use fine or coarse aggregates that contain substances that cause spalling.
 - 3. Local aggregates not complying with ASTM C 33 that have been shown to produce concrete of adequate strength and durability by special tests or actual service may be used when acceptable to Architect.

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- D. Water: Potable and complying with ASTM C 94/C 94M.

2.3 ADMIXTURES

- A. Provide concrete admixtures that contain not more than 0.1percent chloride ions.
- B. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.
- C. Water-Reducing Admixture: ASTM C 494, Type A.
- D. High-Range Water-Reducing Admixture: ASTM C 494, Type for Type G.
- E. Water Reducing and Accelerating Admixture: ASTM C 494, Type E.
- F. Water Reducing and Retarding Admixture: ASTM C 494, Type D.

2.4 CURING MATERIALS

- A. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.
 - 1. Provide material that has a maximum volatile organic compound (VOC) rating of 350 g/L.

2.5 RELATED MATERIALS

- A. Boiled Linseed Oil Mixture: Combination of boiled linseed oil and mineral sprits, complying with AASHTO M-233.
- B. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

2.6 CONCRETE MIXTURES

- A. Prepare design mixtures according to Section 601 of the Kentucky Highway Department Standard Specification for Road and Bridge Construction.

2.7 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to Section 601 of the Kentucky Highway Department Standard Specification for Road and Bridge Construction.

2.8 JOINT MATERIALS FOR EXPANSION JOINTS

- A. Joint Sealant for concrete joints: Refer to Section 321373 "Concrete Pavement Joint Sealant."

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2.9 FIBER REINFORCEMENT

- A. Synthetic Fiber: 100 percent virgin monofilament polypropylene fibers engineered and design for use in concrete paving copying with ASTM C 1116/C116M, Type III 1/2 to 1 1/2 inches long.
 - 1. Provide fibers that have a specific gravity of 0.9, a minimum tensile strength of 70 ksi, graded per manufacturer specifically manufactured to an optimum gradation for use as concrete secondary reinforcement.
 - 2. Uniformly disperse in concrete mixture at manufacturers recommended rate but not less than 1.5 lb/cu.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
- B. Proof-roll prepared subbase surface to check for unstable areas or poor soils conditions and verify need for additional compaction or removal and replacement of subbase material. Do not remove unsuitable subbase soils until reviewed, approved, and measured by the Owner or Architect.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
- B. Check completed form work and screeds for grade and alignment to following tolerances.
 - 1. Top of Forms: Not more than 1/8 inch in 10 feet.
 - 2. Vertical Face on Longitudinal Axis: Not more than 1/4 inch in 10 feet.
- C. Clean forms after each use and coat with form release agent as required to ensure separation from concrete without damage.

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3.4 JOINTS

- A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.
1. When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.
- B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.
1. Provide tie bars at sides of paving strips where indicated.
 2. Use bonding agent on existing concrete surfaces that will be joined with fresh concrete.
 3. Louisville Loop expansion joints: Install lateral expansion joints 30' o.c. Use a felt matt material in expansion joints; pour epoxy waver felt in joint and screed.
- C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.
1. Locate expansion joints at intervals of 30 feet, or as shown on the drawings.
 2. Extend joint fillers full width and depth of joint.
 3. Terminate joint filler not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished surface if joint sealant is indicated.
 4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
 5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
 6. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
- D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth (1/4) of the concrete thickness, as follows:
1. Note: Tooled joints are not permitted for the Louisville Loop concrete pavement. The joints shall be saw cut and located every 10' o.c. No linear control joints will be installed on the Louisville Loop
 2. Sawed Joints (where indicated on drawings): Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3-mm-) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.

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3. Inserts: Form contraction joints by inserting premolded plastic, hardboard, or fiberboard strips into fresh concrete until top surface of strip is flush with paving surface. Radius each joint edge with a jointer tool. Carefully remove strips or caps of two-piece assemblies after concrete has hardened. Clean groove of loose debris.

E. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 3/8-inch radius, unless noted otherwise. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

3.5 PREPARATION OF JOINTS

A. Refer to Section 321373 "Concrete Paving Joint sealants" for preparation and installation of joint sealants.

3.6 CONCRETE PLACEMENT

A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.

B. Remove snow, ice, or frost from subbase surface before placing concrete. Do not place concrete on frozen surfaces.

C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

D. Comply with requirements and ACI 304R requirements for measuring, mixing, transporting, and placing concrete.

E. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

1. When concrete placing is interrupted for more than ½ hour, place a construction joint.

F. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

G. Consolidate concrete by mechanically vibrating equipment supplemented by hand spading, rodding, or tamping. Use equipment and procedures to consolidate concrete complying with 309R.

1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.

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- H. Screed paving surface with a straightedge and strike off. Use bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.
- I. Curbs and Gutters: When automatic machine placement is used for curb and gutter placement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing as specified for formed concrete. If results are not acceptable, remove and replace with formed concrete.
- J. Cold-Weather Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with Section 601 of the Kentucky Department of Highways Standard Specifications for Road and Bridge Construction.
- K. Hot-Weather Placement: Comply with Section 601 of the Kentucky Department of Highways Standard Specifications for Road and Bridge Construction.

3.7 CONCRETE FINISHING

- A. General: Do not add water to concrete surfaces during finishing operations.
- B. Float Finish: Begin floating when bleed water sheen has disappeared and the concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand-floating if area is small or inaccessible to power units. Finish surfaces to true planes within a tolerance of 1/4 inch in 10 feet as determined by a 10-foot-long straightedge placed anywhere on the surface in any direction. Cut down high spots and fill low spots. Refloat surface immediately to a uniform granular texture.
 - 1. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch (1.6 to 3 mm) deep with a stiff-bristled broom, perpendicular to line of traffic.
 - 2. The Louisville Loop will receive a light broom finish parallel with the flow of traffic.
 - 3. Refer to Landscape drawings for special finishes.
- C. Final Tooling: Tool edges of paving, gutters, curbs, and joints formed in fresh concrete with a jointing tool with the following radii. Repeat tooling of edges and joints after applying surface finishes. Eliminate tool mark on concrete finishes.
 - 1. Radius: 3/8 inch or as noted otherwise.
 - 2. Louisville Loop radius: 1/2 inch on the outside edge of pavement.
 - 3. Note: No lateral tooling of Louisville Loop Pavement.

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3.8 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306R for cold-weather protection and ACI 305R for hot weather protection during curing
- B. Evaporation Control: Apply evaporation control material to concrete surfaces if hot, dry, or windy conditions cause rapid moisture loss before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.
- C. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- D. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.
 - 2. Curing Compound (option): Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas that have been subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating, and repair damage during curing period.
- E. Boiled Linseed Oil Treatment (Horizontal Surface): Apply boiled linseed oil mixture no sooner than 28 days after placement to clean dry concrete surfaces free of oil, dirt, or other foreign material. Apply in 2 sprayed applications at rate of 40 sq. yd. per gallon for the first application and 60 sq. yd. per gallon for the second application. Allow complete drying between applications:
 - 1.

3.9 PAVING TOLERANCES

- A. Comply with tolerances in ACI 117 and as follows:
 - 1. Elevation: 3/4 inch (19 mm).
 - 2. Thickness: Plus 3/8 inch (10 mm), minus 1/4 inch (6 mm).
 - 3. Surface: Gap below 10-foot- (3-m-) long, unlevelled straightedge not to exceed 1/4 inch (13 mm).
 - 4. Lateral Alignment and Spacing of Dowels: 1 inch (25 mm).
 - 5. Vertical Alignment of Dowels: 1/4 inch (6 mm).

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6. Alignment of Dowel-Bar End Relative to Line Perpendicular to Paving Edge: 1/4 inch per 12 inches (6 mm per 300 mm) of dowel.
7. Joint Spacing: 3 inches (75 mm).
8. Contraction Joint Depth: Plus 1/4 inch (6 mm), no minus.
9. Joint Width: Plus 1/8 inch (3 mm), no minus.

3.10 PAVEMENT MARKING

- A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.
- B. Allow concrete paving to cure for a minimum of 28 days and be dry before starting pavement marking.
- C. Sweep and clean surface to eliminate loose material and dust.
- D. Apply paint with mechanical equipment to produce markings of dimensions indicated with uniform, straight edges at rates according to KDOH Standard Specification for Road and Bridge Construction.
 1. Apply graphic symbols and lettering with paint-resistant, die-cut stencils, firmly secured to concrete surface. Mask an extended area beyond edges of each stencil to prevent paint application beyond stencil. Apply paint so that it cannot run beneath stencil.
 2. Broadcast glass beads uniformly into wet markings at a rate of 6 lb/gal. (0.72 kg/L).

3.11 FIELD QUALITY CONTROL

- A. The Owner will employ a qualified testing and inspection agency to sample materials, perform tests, and submit test reports during concrete placement. Sampling and testing for quality control may include the following:
 1. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C94
 - a. Slump: ASTM C 143; one test at point of placement for each compressive-strength test but no less than one test for each day's pour of each type of concrete. Additional tests will be required when concrete consistency changes.
 - b. Air Content: ASTM C 231, pressure method; one test for each compressive-strength test but no less than one test for each day's pour of each type of air-entrained concrete.
 - c. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F (4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each set of compressive-strength specimens.
 - d. Compression Test Specimens: ASTM C 31; one set of four standard cylinders for each compressive-strength test, unless directed otherwise. Mold and store

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cylinders for laboratory-cured test specimens except when field-cured test specimens are required.

2. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 3. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.
 4. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength and no individual strength test result falls below specified compressive strength by more than 500 psi.
- B. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
- C. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42, or by other methods as directed.

3.12 REPAIRS AND PROTECTION

- A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Architect.
- B. Drill test cores, where directed by Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with portland cement concrete bonded to paving with epoxy adhesive.
- C. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.
- D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 321313

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SECTION 321373 - CONCRETE PAVING JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This item shall consist of providing and installing a resilient and adhesive joint sealing filler capable of effectively sealing joints in pavements and structures and around the various items embedded in the pavement:
- B. The joint sealant shall be resistant to fuels and hydraulic fluids. The joint sealant shall have not less than five years successful experience in sealing airport concrete pavement joint:

1.3 RELATED SECTIONS

- A. Section 321313 "Portland Cement Concrete Paving" for concrete paving.

1.4 REFERENCES

- A. C719-93 Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle).
- B. C793-91(1997) Standard Test Method for Effects of Accelerated Weathering on Elastomeric Joint Sealants.
- C. D412-97a Standard Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers-Tension.
- D. D1475-90 Standard test Method for Density of Paint, Varnish, Lacquer, and Related Products.
- E. D2240-97 Standard Test Method for Rubber Property-Durometer Hardness.
- F. D5893-96 Standard Specification for Cold Applied, Single Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements.

1.5 SUBMITTALS

Specification Sheet and sample (2 caulking tubes) of each silicone joint sealant.

- A. Specification Sheet and sample for the permanent backer rod (10 LF).

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- B. Sample for the temporary backer rod (10 LF).
- C. Material Safety and Data Sheets for each silicone joint sealant.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

2.2 JOINT SEALANT FOR SEALING PORTLAND CEMENT CONCRETE TO PORTLAND CEMENT CONCRETE JOINTS

- A. The joint sealing material for sealing Portland cement concrete to Portland cement concrete joints shall consist of cold applied silicone sealant (non-acid curing) equal to Dow Corning 888 Silicone Joint Sealant, gun grade, or approved equal, meeting the requirements shown in Table 1.

TABLE 1
SILICONE SEALANT REQUIREMENT
Gun Grade

| <u>Test Method</u> | <u>Test</u> | <u>Material Requirement</u> |
|---------------------------|--|-----------------------------|
| <u>As Supplied</u> | | |
| MIL-S-8802 | Flow, Maximum | 0.2 |
| ASTM D1475 | Specific Gravity | 1.450 to 1.515 |
| MIL-S-998802 | Extrusion Rate, grams per minute | 90-250 |
| MIL-S-8802 | Tack-Free Time, minutes | 35 to 75 |
| <u>Upon Complete Cure</u> | | |
| ASTM D224 | Durometer ¹ | 15 to 25 |
| ASTM D412 | Die C Modulus, at 150% elongation ¹ , psi Maximum | 45 |
| ASTM D412 | Die C elongation ¹ , % minimum | 1200 |
| ASTM C719 ³ | Adhesion to concrete minimum % elongation | 500 |
| <u>Performance</u> | | |
| ASTM C719 | Movement, 10 cycles at + 110/-50% ² | No failure |
| ASTM C793 | Accelerated Weathering, at 5000 hours blisters or bond loss | No cracks |

¹Sample cured 21 days at 77 ± 2F and 50 ±5% relative humidity. Proper joint design and proper joint preparation are necessary for maximum performance.

²Tested on random sample at least on an annual basis.

³ASTM C719 modified to pull sealant to failure without exposure to high and low cyclic temperatures.

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2.3 JOINT SEALANT FOR SEALING PORTLAND CEMENT CONCRETE TO ASPHALTIC CONCRETE PAVEMENT

- A. The joint sealing material for sealing Portland cement concrete to Portland cement concrete joints shall consist of cold applied silicone sealant (non-acid curing) equal to Dow Corning 888 Silicone Joint Sealant, gun grade, or approved equal, meeting the requirements shown in Table 2.

TABLE 2
SILICONE SEALANT REQUIREMENT
(Self-Leveling Grade)

| <u>Test Method</u> | <u>Test</u> | <u>Material Requirement</u> |
|---------------------------|---|-----------------------------|
| <u>As Supplied</u> | | |
| MIL-S-8802 | Flow, Maximum | Self-Leveling |
| MIL-S-8802 | Skin-over time, at 77°F, | 60 minutes, max: |
| <u>Upon Complete Cure</u> | | |
| ASTM D-5893 | Joint Modulus, at 150% elongation ¹ | 10 Psi, maximum: |
| ASTM D-412-97a | Die C Elongation ¹ , & minimum..... | 1400 |
| ASTM D-5893 | Tensile Adhesion to Concrete ¹ | 60% elongation, minimum |
| MIL-S-08802 | Peeled adhesion to unprimed Concrete, lbs/inch, minimum: | 20 |
| <u>Performance</u> | | |
| ASTM C719 | Movement, 10 cycles at + 100/-50% ² | No failure |

¹Sample cured 21 days at 77 ± 2F and 50 ±5% relative humidity. Proper joint design and proper joint reparation are necessary for maximum performance.

²Randomly tested by the manufacturer; test not less than one sample per lot of manufactured sealant furnished on the project.

2.4 PREFORMED BACKER RODS

- A. Prefomed backup rods, as shown on the plans, shall be used to control the depth of the sealant, to achieve the desired shape factor, to support the sealant against indentation and sag, and shall be a non-moisture absorbing resilient material.
- B. Backup materials (backer rods) shall be manufactured from closed cell polyethylene (resilient) foam rubber compatible with the sealant, and recommended for such use by the sealant manufacturer, shall not adhere to the sealant, shall be compressible without extruding the sealant, and shall recover to maintain contact with the joint faces when the joint is open and shall be subject to approval by the Architect.
- C. For 3/8 inch wide joints, use 1/2 inch diameter backer rods and for 3/4 inch wide joints, use 1" diameter backer rods, (unless otherwise shown on the Plans or approved by the Architect) so

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that the backer rods are always compressed **in** its installed position between the concrete joint surfaces.

2.5 SAMPLES

- A. Samples of all materials which the Contractor proposes for use and copies of the manufacturer's recommendations for mixing and installation shall be submitted to the Project Engineer for approval at least thirty (30) days prior to use.

2.6 SUBMITTAL REQUIREMENTS

- A. Each lot or batch of sealing material shall be delivered to the job site **in** the manufacturer's original sealed container. Each container shall be labeled to include the following:
 - 1. Name of Material
 - 2. Manufacturer's Name
 - 3. Manufacturer's Lot Number
 - 4. Production Date
 - 5. Shelf Life
 - 6. Mixing Instructions
 - 7. Storage Instructions
 - 8. Placement Instructions
- B. Each lot or batch delivered to the job shall also be accompanied by a "Material Safety Data Sheet" (MSDS), and the Manufacturer's Certification stating that the compound meets the requirements of this specification including its compliance with the jet fuel and hydraulic fluids resistance provisions.
- C. When required by the Project Engineer, the Contractor shall provide test report of the sealant properties demonstrating conformance of the sealant to the Contract Specifications

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 TIME OF APPLICATION

- A. The joints shall be sealed immediately following the concrete curing period or as soon thereafter as weather conditions permit, and before the pavement is used for material storage or opened to traffic, including construction.

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- B. The concrete shall be cured and dry (not less than 7 days old unless otherwise ordered by the Project Engineer), and the joint surfaces shall be clean at the time of the sealant application.
- C. At the time of application of the sealing compound, the atmospheric and pavement temperature shall be above 50°F and the weather shall not be rainy or foggy. The temperature requirements may be waived only when so directed by the Project Engineer

3.3 EQUIPMENT

- A. All equipment necessary for the proper construction of this work shall be on the project in first class working condition.
- B. The equipment shall be as recommended by the manufacturer of the sealer and approved by the Architect before construction is permitted to start.
- C. Air compressors shall be equipped with suitable traps capable of removing all free water and oil from the compressed air and shall be capable of furnishing air with a pressure greater than 90 psi.

3.4 PREPARATION OF JOINTS

- A. Immediately before sealing, the temporary backer rods shall be removed, the joints shall be thoroughly cleaned of all laitance, curing compound, protrusions or hardened concrete, dirt, dust, vegetation and other foreign material. When the surfaces are clean and dry, and just prior to placement of the sealant, compressed air shall be used to blow out the joint and remove all residual dust. The joint faces shall be sound and surface dry when the seal is applied.
- B. When sealing Portland cement concrete-to-asphaltic concrete joints, the surface preparation and application shall be in strict accordance with the sealer's manufacturer written instructions, subject to the Project Engineer's approval.

3.5 INSTALLATION OF SEALANTS

- A. Joints shall be inspected for proper width, depth, alignment, condition of the concrete and preparation, and shall be approved by the Architect before sealing is allowed.
- B. Sealant shall be installed in accordance with the manufacturer's written recommendations and the following requirements:
 - 1. Backer rods shall be installed, using a suitable roller device recommended for such use by the sealant manufacturer, in the bottom of the joint to be filled to control the depth of the sealant, to achieve the desired shape factor, and to support the sealant against indentation and sag.
 - 2. The sealant shall be applied in a continuous operation, pumped directly from the original container using an approved mechanical device that will force the sealant to the

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bottom of the joint and completely fill the joint without spilling the material on the surface of the pavement, and shall adhere to the concrete (Portland cement concrete and/or bituminous concrete as the case may be) and shall be free of voids.

3. The gun grade sealant shall be tooled, forcing it onto the backer rod and against the joint faces with an appropriate tool, to produce a slightly concave surface approximately 1/4" below the pavement surface and for self-leveling grade shall be extruded to form a horizontal surface 1/4" below the pavement surface. Tooling shall be accomplished before a skin forms on the surface, usually within 10 minutes of application.
 4. Sealant which does not bond to the concrete (Portland cement concrete and/or bituminous concrete as the case may be) surface of the joint walls, contains voids, or fails to set to a tack-free condition will be rejected and replaced by the Contractor at no additional cost to the Owner.
 5. During the course of the work any batches that do not have good consistency for application shall be replaced.
 6. Excess sealant on the pavement surface shall be immediately removed.
 7. An approved primer shall be used at joints when recommended in writing by the manufacturer.
- C. The Contractor shall have a manufacturer's technical representative on the project at the start of the joint sealing operation to observe the methods and means employed by the Contractor to install the joint sealer. The manufacturer's technical representative(s) shall conduct the demonstration(s), train the Contractor's personnel, and ensure that the installation procedures are in accordance with the manufacturer's directions prior to the start of the sealing operations. The representative(s) shall visit the job site at least two (2) times during the sealing operation and after the sealing is completed, shall conduct a general inspection of the work and perform more extensive inspections and/or testing on a random basis to reasonably assure that the construction is in accordance with the manufacturer's recommended construction methods and procedures. The manufacturer's representative report outlining the findings shall be submitted to the Architect at the completion of the inspection.

3.6 FIELD TEST

- A. Before sealing the joints, the Contractor shall demonstrate that the equipment and procedures for preparing, mixing, and placing the sealant will produce a satisfactory joint seal. This shall include the preparation of two small batches and the application of the resulting material.

END OF SECTION 321373

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SECTION 321723 - PAVEMENT MARKINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Manual on Uniform Traffic Control Devices (MUTCD), latest edition.
- C. Kentucky Department of Highways (KDOH) Standard Specifications for Road and Bridge Construction and Standard Drawings.

1.2 SUMMARY

- A. This section includes the following:
 - 1. Pavenment Striping and Markings
- B. Related Requirements:
 - 1. Section 101426 "Exterior Signage" for coordination of locations of signage and pavement markings.
 - 2. Section 321216 "Hot-Mix Asphalt Paving" for surface to apply markings.
 - 3. Section 321313 "Portland Cement Concrete Paving" for surface to apply markings.

1.3 SYSTEM DESCRIPTION

- A. Provide pavement markings according the materials, workmanship, and other applicable requirements of the KDOH's Standard Specifications for Road and Bridge Construction and Drawings.
 - 1. Standard Specification: As indicated for Section 712 – Raised Pavement Markers, Section 713 – Permanent Pavement Striping, and Section 714 – Durable Pavement Striping.
 - 2. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section

1.4 SUBMITTALS

- A. Product Data: For each type of product specified. Include manufacturer's technical data and tested physical and performance properties.
- B. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project

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names and addresses, names and addresses of architects and owners, and other information specified.

- C. Material Test Reports: Engage a supplier meeting the requirements set forth in the (KDOH) Specifications and Standards with a record of successful in-service performance.
- D. Material Certificates: Certificates signed by manufacturers certifying that each material complies with requirements.
- E. Shop Drawings: For pavement markings.
 - 1. Indicate pavement markings, colors, lane separations, defined parking spaces, and dimensions to adjacent work.
 - 2. Indicate, with international symbol of accessibility, spaces allocated for people with disabilities.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who has placed pavement markings similar in material, markings, and extent to that indicated for this Project, and with a record of successful in-service performance.
- B. Manufacturer Qualifications: Engage a supplier meeting the requirements set forth in the (KDOH) Specifications and Standards and with a record of successful in-service performance.
 - 1. Firm shall be approved by authorities having jurisdiction or KDOH.
- C. Pavement Markings: Comply with Manual on Uniform Traffic Control Devices, latest edition.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F (4.4 deg C) for oil-based materials 55 deg F (12.8 deg C) for water-based materials, and not exceeding 95 deg F (35 deg C). The anticipated minimum temperature shall remain at or above these for four (4) hours after completing application. Operation shall cease during rainfall.

PART 2 - PRODUCTS

2.1 PAVEMENT-MARKING PAINT

- A. General: The paint shall be homogeneous, easily stirred to smooth consistency, and shall show no hard settlement or other objectionable characteristics during a storage period of six months. Paint shall be per the requirements of the KDOH Standard Specifications for fine and course aggregates. Pavement marking paints shall comply with applicable state and local laws enacted to ensure compliance with Federal Clean Air Standards. Paint materials shall conform to the restrictions of the local Air Pollution Control District.

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- B. Pavement-Marking Paint: Latex, waterborne emulsion, lead and chromate free, ready mixed, complying with FS TT-P-1952, Type II, with drying time of less than three (3) minutes. Paint shall conform to Section 842 of KDOH's Standard Specifications.

- 1. Colors: White, yellow, and blue or as selected by the Architect or Owner.

2.2 REFLECTIVE MEDIA

- A. Reflective media for roads, streets, and other pavement shall conform to the requirements of KDOH's Standard Specification for Road and Bridge Construction.

2.3 AUXILIARY MATERIALS

- A. Thermoplastic Pavement Marking Material and Glass Beads: Thermoplastic marking material and glass beads shall conform to Sections 837 and 839 respectively of KDOH's Standard Specifications.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect existing pavement surfaces for conditions and defects that will adversely affect quality of work, and which cannot be put into an acceptable condition through normal preparatory work as specified.
- B. Verify that pavement is dry and in suitable condition to begin pavement markings.
- C. Verify new asphalt is complete, has been accepted by the Architect or Owner, and has cured a minimum of fourteen (14) days.

3.2 PAVEMENT MARKING

- A. Surfaces to be marked shall be thoroughly cleaned before application of the pavement marking material. Dust, dirt, and other granular surface deposits shall be removed by sweeping, blowing with compressed air, rinsing with water, or a combination of these methods as required. Rubber deposits, surface laitance, existing paving markings, and other coatings adhering to the pavement shall be completely removed with scrapers, wire brushes, sandblasting, approved chemicals, or mechanical abrasion as directed. Areas of old pavement affected with oil or grease shall be scrubbed with several applications of tri-sodium phosphate solution or other approved detergent or degreaser, and rinsed thoroughly after each application. After cleaning, oil-soaked areas shall be sealed with cut shellac to prevent bleeding through the new paint. Pavement surfaces shall be allowed to dry, when water is used for cleaning, prior to striping or marking. Surfaces shall be re-cleaned, when work has been stopped due to rain.
- B. In general, markings shall not be placed over existing pavement marking patterns. Existing pavement markings, which are in good condition but interfere or conflict with the newly

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applied marking patterns, shall be removed. Deteriorated or obscured markings that are not misleading or confusing or interfere with the adhesion of the new marking material do not require removal. New preformed and thermoplastic pavement marking shall not be applied over existing preformed or thermoplastic markings. Whenever grinding, scraping, sandblasting or other operations are performed, the work must be conducted in such a manner that the finished pavement surface is not damaged or left in a pattern that is misleading or confusing. When these operations are completed the pavement surface shall be blown off with compressed air to remove residue and debris resulting from the cleaning work.

3.3 APPLICATION:

- A. All pavement markings and patterns shall be placed as shown on the plans, per MUTCD manual, KDOH Standard Specifications and Drawings, or as directed by the Architect or Owner.
- B. Paint shall be applied to clean, dry surfaces, and only when air and pavement temperatures are above 40 degrees F and less than 95 degrees F. Paint temperature shall be maintained within these limits. Paint shall be applied pneumatically with approved equipment at rate of coverage specified. The Contractor shall provide guide lines and templates as necessary to control paint application. Special precautions shall be taken in marking numbers, letters, and symbols. Edges of markings shall be sharply outlined.
- C. Paint application rates shall conform to the KDOH Standard Specifications and requirements, local agency requirements, and as recommended by the paint manufacturer.
- D. All markings and striping shall be protected from injury and damage of any kind while the material is drying. The contractor shall use proper and sufficient directional signs, warning devices, barricades, pedestals, lights, traffic cones, flag persons, or such other devices to protect the work, workers, and public.

3.4 DRYING

- A. The maximum drying time requirements set forth by the paint manufacturer will be strictly enforced to prevent undue softening of bitumen, and pickup, displacement, or discoloration by vehicle tires.

3.5 REFLECTIVE MEDIA

- A. Application of reflective media shall immediately follow application of pigmented binder. Drop-on application of glass beads shall be accomplished to insure that reflective media is evenly distributed at the specified rate of coverage. Should there be a malfunction of either paint applicator or reflective media dispenser, operation shall be discontinued immediately until deficiency is corrected.

3.6 PLACEMENT OF RAISED PAVEMENT MARKERS

- A. Preparation of surfaces and placement of raised pavement markers shall conform to the requirements of KDOH's Standard Specifications and Drawings and the MUTCD.

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- B. The Contractor shall provide an experienced technician to supervise the application of the raised pavement markers. In areas of high traffic volume, the Contractor shall schedule work to apply traffic markers in off-peak traffic hours or weekends.

3.7 FIELD QUALITY CONTROL

- A. Obtain the approval of Architect or Owner of layout of guide markings, templates, forms, or stencils prior to application of permanent pavement markings.

END OF SECTION 321723

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SECTION 321840 – STONE FINES AND STEPPING STONE PAVING

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes crushed stone paving and limestone stepping stones for the Excursion Trails.

1.2

- A. Product Data:

- 1. Submit data for aggregate, including sieve analysis.

- B. Samples:

- 1. Submit name of materials suppliers.
- 2. Submit, in air-tight containers, 10 lb sample, each type of aggregate material to testing laboratory.
- 3. Submit photographs of selected stepping stones for verification of shape, color, and suitability of stones.

- C. Material certificates: Certify Products meet or exceed specified requirements.

1.3 QUALITY ASSURANCE

- A. Furnish each material from a local, single source throughout the work.
- B. Conform to ASTM C 136, Method for Sieve Analysis of fine and Coarse Aggregates.

1.4 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install crushed stone paving if ground is frozen.

PART 2 - PRODUCTS

2.1 STONE FINE AGGREGATES

- A. Sub-Based Aggregate: Provide crushed, pit run, or screen stone or gravel consisting of hard durable particles free from clay lumps, cementation, organic material, frozen material, or other deleterious materials.
 - 1. Gradations within limits specified when tested to AASHTO 57.

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| Sieve Size | Percent Passing |
|------------|-----------------|
| 1-1/2 inch | 100 |
| 1 inch | 90-100 |
| 3/8 inch | 20-55 |
| Number 4 | 0-10 |
| Number 8 | 0-5 |

- B. Finish Aggregate: Crushed limestone; locally sourced.
 - 1. Color: As selected by Architect
 - 2. Gradation within limits specified when tested to AASHTO-57:

| Sieve Size | Percent Passing |
|---------------------|-----------------|
| 3/4 inch | 70-100 |
| 3/8 inch | 50-80 |
| #4 (3/16") | 30-65 |
| #30 (med-fine sand) | 10-40 |
| #200 (silt/clay) | 4-13 |

2.2 STEPPING STONES

- A. Stepping stones are for use within designated areas of the Excursion Trail where crossing of existing drainage features is proposed. Utilize natural limestone pieces, 4-6" in thickness and 18-24" in overall size, placed with 12-18" spacing separation along approximate centerline of the proposed trail.

2.3 ACCESSORIES

- A. Water: Potable.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify subgrade is compacted, tested, and dry.
- B. Verify subgrade elevations are as indicated on Drawings and within specified tolerances.

3.2 PREPARATION

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

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3.3 AGGREGATE PLACEMENT

- A. Moisten subgrade to provide uniform dampened condition at time of aggregate placement.
- B. Spread base course aggregate over prepared subgrade to a total compacted thickness as indicated on the Drawings to 95% of maximum density.
- C. Spread stone fines aggregate over prepared base course to a minimum compacted thickness as indicated on the Drawings to 95% of maximum density
 - 1. Crown paving at center of pathways, minimum ¼ inch per foot for positive slope to edge of paving.

3.4 TOLERANCES

- A. Maximum variation from flat surface: ¼ inch measured with 10 foot straight edge.
- B. Maximum variation from indicated thickness: ¼ inch.
- C. Maximum variation from indicated Elevations: ½ inch.

3.5 FIELD QUALITY CONTROL

- A. Perform laboratory material tests in accordance with ASTM D1557.
- B. Perform in-place compaction tests in accordance with the following:
 - 1. Density Tests: ASTM D1556 or ASTM D2922
 - 2. Moisture Tests: ASTM D3017
- C. Frequency of tests: Two tests for every 2,500 sf of fill material placed.
- D. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no additional cost to Owner.

END OF SECTION 321840

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SECTION 323223 SEGMENTAL RETAINING WALLS

PART 1 - GENERAL

1.1 SCOPE

- A. This work shall consist of furnishing the design, materials, labor, equipment, and any incidentals necessary for the construction and placement of segmental retaining wall (SRW) units . The design provided by the contractor shall clearly address any ground reinforcement and foundation reinforcement required for support of the SRW. The lump sum price for construction of the project shall include all materials, labor, equipment, and any incidentals necessary to construct the ground reinforcement and foundation reinforcement needed for support of the SRW.
- B. The Contractor shall perform the necessary work to verify that the foundation is at the correct elevation, that the wall is constructed to the correct alignment, and that the work is in accordance with the specified tolerances. The checking of alignments and tolerances shall include verifying that the plumbness of the SRW units is in accordance with Part 3.4 over the entire height of the wall. Alignment shall be checked at each layer of SRW units after the backfill behind the SRW units has been compacted, and the results shall be recorded

1.2 GENERAL DESIGN REQUIREMENTS

- A. The SRW shall consist of an aggregate leveling pad, concrete SRW units, and all ground reinforcement elements, and foundation improvements to existing ground under the SRW to provide the proper support for the SRW units. Ground reinforcement shall have sufficient strength, frictional resistance, and quantity as required by design. Foundation improvements shall be designed and constructed to provide required stability and bearing pressures to support the SRW
- B. All SRW units shall be constructed in accordance with the approved plans and shop drawings based on the requirements herein. The recommendations of the wall system supplier shall not override the minimum performance requirement specified.
- C. If the wall manufacturer needs additional information to complete the design, the Contractor shall be responsible for obtaining such information.
- D. All appurtenances behind, in front of, under, mounted upon, or passing through the wall such as drainage structures, utilities, or other appurtenances shown on the plans shall be accounted for in the stability design of the wall
- E. The SRW design shall follow the general dimensions of the wall envelope show on the plan. The plans will locate the leveling pad at or below the theoretical leveling pad. The top of the SRW unit shall be at or above the top of the wall elevation shown on the plans.

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- F. The top of the SRW shall be designed to prevent the removal of the top course of blocks. Cast-in-place concrete will not be an acceptable replacement for any SRW unit within the areas noted by the wall envelope.
- G. SRW units shall be designed and constructed to accommodate differential settlement of no more than 1 linear unit in 100 linear units. Where shown on the plans, slip joints to accommodate settlement shall be included. In order to comply with this criteria, the contractor may need to make improvements to the existing ground such that the foundation is suitable to construct the SRW units. The cost for any improvements to the existing ground to provide a proper foundation for SRW units such that settlement is addressed in accordance with the above criteria is the responsibility of the contractor and shall be included in the bid provided for the project. The contractor shall monitor settlement of the SRW units and report to the Owner when settlement of the SRW units has ceased. Any monitoring of settlement during construction, such as placement of settlement platforms, shall be included in the bid provided for the project

1.3 DESIGN CRITERIA

- A. The design by the manufacturer shall be completed to satisfy requirements for the internal and the external stability of the stabilized volume and wall mass, and shall consider the bearing pressure, lateral sliding and overturning. The design shall be completed in accordance with the applicable requirements of the AASHTO Standard Specifications for Highway Bridges unless otherwise specified herein.
- B. External loads which affect the internal stability shall be accounted for in the design. The size of all structural elements shall be determined such that the design load stresses do not exceed the allowable stresses found in the AASHTO Standard Specifications for Highway Bridges, unless otherwise shown on the plans.
- C. SRW units for "RR" Type Walls shall be the "Limestone" Pattern as manufactured by Redi-Rock as produced by a licensed manufacturer or approval equal. The SRW wall pattern shall comply with the following design criteria for pattern, module, and color:
 - 1. Pattern: Limestone.
 - 2. Module: 46"L x 18"H x 23"W, nominal.
 - 3. Color: Natural concrete color.
- D. The phi, (ϕ), angle for the internal design of the stabilized volume shall be assumed to be 34° or greater and select material shall be provided to achieve this value. The (ϕ) angle of the back-fill behind the stabilized earth mass shall be assumed to be 30° or greater and select material shall be provided to achieve this value. Before construction begins, the granular backfill materials selected shall be tested by the Contractor to confirm compliance with the frictional requirement. The wall supplier shall be furnished a copy of the testing results for the backfill. . Geotechnical data within the Geotechnical Report prepared by AMEC is contained as part of the bid documents.

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- E. The wall shall be defined by the wall envelope shown on the plans. For design purposes, the height of wall H shall be measured from the theoretical top of the leveling pad to the top of the wall. For a level surcharge situation, the top of the wall shall be measured to the top of the coping or to the gutter line of the traffic barrier. The top of the wall shall be the theoretical top of the segmental retaining wall units only when a coping or barrier is not used. For an abutment face, the design height H shall be defined as the height measured from the top of the leveling pad to the top of the roadway surface. For a wall with a sloping surcharge the top of the wall shall be measured at a point 0.3H back from the face where the design height is H and the actual wall height is H.
- F. Vertically adjacent units shall be connected with approved shear connections or interlocking by means of integral lugs or lips, pins, or clips.
- G. The ground reinforcement shall be the same length from the bottom to the top of each SRW section. Differing ground reinforcement elements shall be clearly marked for ease of construction. The minimum length of the ground reinforcement shall be 8 ft (2.44m) or 0.7H for a wall with sloping surcharges, or in accordance with the AASHTO Standard Specifications for Highway Bridges for an abutment on a spread footing.
- H. The ground reinforcement for SRW sections shall be sized using the lesser of the allowable forces for each specific connection and each specific reinforcing element. The connection's allowable force shall be taken as 2/3 of the connection test load at the allowable pullout deformation limit 1/2 in. (13mm) or 1/2 of the ultimate load, whichever is less.
- I. The ground reinforcement length shall be required for internal design or as shown on the plans. The length shall exceed the minimum noted as required for design consideration. One hundred percent of the ground reinforcement, which is designed and placed in the reinforced earth volume, shall extend to and shall be connected to the SRW units.
- J. Where the presence of opposing walls limits the length of ground reinforcing, the design shall account for the reduced length and internal and external stability calculations shall be made to check for adequate factor of safety.
- K. The actual applied bearing pressures under the stabilized mass for each reinforcement length shall be clearly indicated on the shop drawings and shall be equal to or less than the maximum allowable soil pressure shown on the plans. Passive pressure in front of the wall mass will be assumed to be zero for design purposes.
- L. SRW units for "AB" Type Walls shall be "AB Collection" as manufactured by Allan Block as produced by a licensed manufacturer or approval equal. SRW units shall comply with the following design criteria for series, texture, module and color:
 - 1. Series: AB Collection
 - 2. Texture: Classic Cut
 - 3. Module: 18"L x 8"H x 12"W (standard unit, nominal); 18"Lx4"Hx12"W (cap, nominal).

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4. Color: Natural

1.4 SUBMITTALS

- A. The contractor shall submit one copy of the design computations for approval.
 1. The design drawings shall include all details, dimensions, quantities and cross-sections necessary to construct the wall and shall include, but not be limited to, the following:
 - a. A plan and elevation sheet or sheets for each wall.
 - b. An elevation view of the wall which shall include the elevation at the top of the wall at all horizontal and vertical break points at least every 50 ft (15m) along the face of the wall, all steps in the leveling pads, the designation as the type of SRW unit, the length of ground reinforcement (if required), the distance along the face of the wall to where changes in length of the ground reinforcement occur, and an indication of the original and final ground lines and maximum bearing pressures.
 - c. A plan view of the wall indicates the offsets from the construction centerline to the face of the wall at all changes in horizontal alignment. A plan view and elevation view which detail the placing position and connection of all ground reinforcing elements in areas where piling, utility, or other structures are near the wall.
 - d. A typical cross-section or cross-sections showing elevation relationship between ground conditions and proposed grades.
 - e. All general notes required for constructing the wall.
 - f. All horizontal and vertical curve data affecting the wall.
 - g. A listing of the summary of quantities on the elevation sheet for each wall.
 2. All SRW units shall show all dimensions necessary to construct the element and the location of soil reinforcing system devices embedded in the units.
 3. The details for construction of walls around drainage facilities.
 4. All details of the architectural treatment.
 5. The details for diverting ground reinforcement around obstruction such as piles, catch basins, landscape plantings where bottom of the root ball extends below the top level of ground reinforcement, and other utilities shall be submitted for approval.
 6. The details for mechanical connection between the SRW unit and the ground reinforcement.
 7. Design Calculation and shop drawings shall be submitted to the Engineer for review and approval.
 8. Foundation Preparation Plan: Plan prepared and to be implemented by the Contractor to address subgrade stability, provide bearing pressure required for support of SRW, and to meet settlement criteria.

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PART 2 - PRODUCTS

2.1 MATERIALS

A. The Contractor shall make arrangements to supply the materials described herein, including concrete SRW units, fasteners, joint materials, ground reinforcement, and all necessary incidentals. Materials shall be in accordance with the following:

- | | | |
|----|--|--------|
| 1. | Course Aggregate, Class A or Higher, Size No. 8* or 91 | 805 |
| 2. | Concrete Admixtures** | 802 |
| 3. | Concrete | 601 |
| 4. | Course Aggregate, Size No. 23 | 805 |
| 5. | Fly Ash | 801 |
| 6. | Geotextile | 843 |
| 7. | Portland Cement | 801 |
| 8. | Structure Granular Backfill | 805.11 |
| 9. | Water | 803 |

*Course aggregate No. 8 used as drainage fill shall consist of 100% crushed stone.

**Admixtures in accordance with ASTM C 1372 may be used for the SRW if approved by the engineer.

B. Backfill material used in the SRW stabilized volume shall be structure granular backfill in accordance with 805.11. Where ground reinforcement is required, nominal size aggregate No. 30 shall not be used.

C. The internal friction or ϕ angle of the structure granular backfill in the stabilized backfill shall not be less than 34° in accordance with AASHTO T 236 or AASHTO T 297 under consolidated drained conditions. Testing for the ϕ angle shall be performed on the portion finer than No. 8 (2.36 mm) sieve, using a sample of the material compacted to 95% in accordance with AASHTO T 99, methods, C, or D. No testing for the ϕ angle is required when 80% of the materials are greater than No. 4 (4.75 mm) sieve. An approved geotechnical laboratory shall perform the tests. Structure granular backfill criteria shall be as follows:

| | <u>Property</u> | <u>Criteria</u> | <u>Test Method</u> |
|----|--------------------------|----------------------------|----------------------------------|
| 1. | pH | 5<p<10 | AASHTO T 289 |
| 2. | Organic Content | 1% max. | AASHTO T 267 |
| 3. | Permeability & Gradation | 30ft/day (9m/day)(min.) | AASHTO T 215 AASHTO T11 & T27 |

All of the above tests shall be run a minimum of once per 2 calendar years per source.

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2.2 CONCRETE SEGMENTAL RETAINING WALL UNITS

- A. Concrete SRW units shall be in accordance with ASTM C 1372 and shall have a minimum compressive strength of 4000 psi (27.5 MPa) at 28 days. SRW units utilizing type I or II cement will be considered acceptable.
- B. Retarding agents, accelerating agents, coloring pigments, or additives containing chloride shall not be used without approval.
- C. Wall units shall be made with Ready- Mixed concrete in accordance with ASTM C94, latest revision, and per the following:
 1. Climate: Severe
 2. Air Content: 4½- 7½%
 3. 28 Day Compressive Strength, psi: 4000
 4. Slump: 5"± 1½"; * Higher slumps are allowed if achieved by use of appropriate admixtures.
 5. Notwithstanding anything state above, all material used in the wall units must meet applicable ASTM and local requirements for exterior concrete.
- D. Exterior block dimensions shall be uniform and consistent. Maximum dimensional deviations shall be 1% excluding the architectural surface. Maximum width (face to back) deviation including the architectural surface shall be 1.0 inches.
- E. Exposed faces of units shall be finished (colored and textured) as specified; this includes, but is not limited to, the exposed end faces of course and cap stone units where offsets or stepdowns in wall profiles occur. Other surfaces to be smooth form type. Dime-size-bug holes on the block face may be patched and/or shake-on color stain can be used to blend into the remainder of the block face. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M, flat sheet.
 1. Testing and Inspection
 - a. Material properties shall be in accordance with the requirements of Part 2.1 in lieu of Section 4.
 - b. Table 1, "Strength and Absorption Requirements", shall be modified to require that the average compressive strength, when sampled and tested in accordance with ASTM C 140, of a three CMU compressive strength sample shall be 4000 psi (27.5 MPa) with no individual unit less than 3500 psi (24.1 MPa). Maximum absorption shall be 6%.
 - c. The SRW unit's compressive strength shall be considered acceptable regardless of curing age when compressive test results indicate that the compressive strength is in accordance with Part 2.1 (a).
 - d. Freeze-thaw durability testing shall be completed in accordance with Section 8.3 by a laboratory approved by the KYTC. Test results shall have been completed in

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accordance with ASTM C 1372 and be within 12 months prior to delivery. Certification in accordance with the KYTC Division of Material's requirements for the freeze-thaw durability testing shall be submitted to the Engineer prior to use of the block.

- e. Sampling and testing of the manufacturer's production lots will be conducted by the Engineer in accordance with ASTM C 140. If the compressive strength test result does not meet the requirements of Part 2.1 (a), the production lot units may not be used. The manufacturer may resample the same production lot in the presence of the Engineer for retesting. The Engineer will test the additional samples in accordance with the ASTM C 140. If the retested samples meet with the requirements of Part 2.1 (a), the production lot may be used. If the retested samples do not meet with the requirements of Part 2.1(a), all of the units from the production lot may not be used.
2. Rejection: Units shall be subject to rejection due to failure to be in accordance with the requirements specified above. In addition, the following defects may be sufficient cause for rejection.
 - a. Defects which indicate imperfect molding.
 - b. Defects which indicate honeycombed or open texture concrete
 - c. Defects in the physical characteristics of the concrete, such as broken or chipped concrete, or color variations or dunnage marks on the front face due to excessive
 - d. The Engineer will determine whether spalled, honeycombed, chipped, or otherwise defective concrete shall be repaired or be cause for rejection. Repair of concrete, if permitted, shall be completed in a satisfactory manner. Repair to concrete surfaces, which are to be exposed to view after completion of construction shall be subject to approval.
 3. Marking: The date of manufacture, the production lot number, and the place mark shall be clearly scribed on the rear face of each unit or on each shipping pallet.
 4. Handling, Storage, and Shipping: All SRW units shall be handled, stored, and shipped so as to eliminate the danger of chipping, cracks, fracture, and excessive bending stresses.
 - a. Contractor shall check the materials upon delivery to assure proper material has been received.
 - b. Contractor shall prevent excessive mud, wet cement and like materials from coming in contact with the SRW units.
 - c. Contractor shall protect the materials from damage. Damaged material shall not be incorporated in the project.

2.3 AGGREGATE LEVELING PAD

- A. Aggregate for the leveling pad shall be compacted aggregate No. 57 and shall be in accordance with the applicable requirements of 302:

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2.4 GROUND REINFORCEMENT

- A. The ground reinforcement, if required, shall be geogrid. The ground reinforcement used shall be consistent with that used in the pullout test and shall be consistent throughout the project.
- B. Certification in accordance with the KYTC Division of Material’s requirements for geogrids shall be submitted to the Engineer prior to use of the materials.
- C. Geogrid shall be on a regular network of integrally connected polymer tensile elements with aperture geometry sufficient to permit significant mechanical interlock with the surrounding material. The geogrid structure shall be dimensionally stable and shall be able to retain its geometry under construction stresses. The geogrid structure shall have a resistance to damage during construction, ultraviolet degradation, and all forms of chemical and biological degradation, and all forms of chemical and biological degradation encountered in the soil being placed on.
- D. Geogrids shall be in accordance with the property requirements as specified in the Geosynthetic Research Institute Standard Test Methods GG1, GG3, GG4, and ASTM D 5262.
- E. During periods of shipment and storage, the geogrid shall be protected from temperatures greater than 140°F (60°C), mud, dirt, dust, and debris. Each geogrid roll shall be labeled or tagged to provide product identification. The manufacturer’s recommendations shall be followed with regard to protection from direct sunlight. At the time of installation, the geogrid will be rejected if it has defects, tears, punctures, flaws, deterioration, or damage incurred during manufacture, transportation, or storage. All damaged portions of geogrid for the entire width shall be replaced.
- F. Only geogrids selected from the KYTC list of approved Geogrids shall be used. No relabeled materials will be considered for approval.
- G. A specified material shown on the approved list will not be listed under more than one name. The geogrid shall be in accordance with the property requirements for the type specified as follows:

1. Type I

| PROPERTY | TEST METHOD | UNIT | VALUE, Min. |
|---|------------------|----------------------------|--------------------------------------|
| Aperture | Calibered | in.(mm) | 0.5 x 0.5 (13 x 13) |
| Open Area | COE, CW02215 | percent | > 50.0, 80.0 |
| Tensile Modulus, machine direction cross machine direction | ASTM D 66371,2,3 | lb/ft (N/m) lb/ft (N/m) | 10,000 (146 000) 10,000 (146 000) |
| Ultimate Strength, machine direction cross machine direction | ASTM D 66372,3 | lb/ft (N/m) lb/ft (N/m) | 800 (11 670) 800 (11670) |

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1. Secant modulus at 5% elongation.
2. Results for machine direction, MD, and cross machine direction, CMD, are required.
3. Minimum average roll values shall be in accordance with ASTM D 4759.

2. Type II

| PROPERTY | TEST METHOD | UNIT | VALUE, Min. |
|---|--|----------------|---------------------|
| Aperture | Calibered | in.(mm) | 0.5 x 0.5 (13 x 13) |
| Open Area | COE, CW02215 | percent | > 50.0, 80.0 |
| Tensile Modulus, machine direction cross | ASTM D 66371,2,3 | lb/ft (N/m) | 10,000 (146 000) |
| Ultimate Strength, machine direction cross | ASTM D 66372,3 | lb/ft (N/m) | 800 (11 670) |
| 1. Secant modulus at 2% elongation | 2. Minimum average roll values shall be in accordance with ASTM D4759 | | |

3. Fiberglass rod used in the Type 1AT Geogrid connection shall be 7/16" diameter. Only fiberglass rod obtained from an authorized manufacturer's dealer or approved equal shall be used.

2.5 BACKFILL MATERIAL

- A. Backfill material used in the SRW structure volume shall be structure granular backfill.
- B. Certification in accordance with the KYTC Division of Material's requirements for the structure granular backfill shall be furnished prior to use of the materials. One copy of all tests results performed by the Contractor, which are necessary to demonstrate compliance with the specifications, shall be furnished to the Engineer.
- C. Drainage fill used behind the SRW, as shown on the plans, shall be coarse aggregate No. 57 (25.4 mm) in accordance with 805. Free draining backfill material shall be washed stone and shall be placed to a minimum of 1' width behind the back of the wall.
- D. Backfill material shall be approved by the contractor's geotechnical engineer and submitted to the Owner for concurrence. Site excavated soils may be used if approved unless otherwise specified in the drawings. Unsuitable soils with a PL>6, organic soils, and frost susceptible soils shall not be used within a 1 to 1 influence area.
- E. Non-woven geotextile cloth shall be placed between the free draining backfill and retained soil, if required.

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- F. Where additional fill is needed, Contractor shall submit sample and specifications to the Engineer for approval.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

- A. The wall supplier representative shall provide technical instruction, guidance in pre-construction activities including the preconstruction conference and on-site technical assistance to the Contractor during construction.

3.2 FOUNDATION PREPARATION

- A. The foundation shall be prepared in accordance with the Foundation Preparation Plan submitted by the Contractor.
- B. The foundation for the structure shall be graded level for the width shown on the plans. Prior to wall construction, the foundation, if not in rock, shall be compacted in accordance with 603. The base of the wall excavation shall be proofrolled with approved compacting equipment.
- C. At each foundation level, an aggregate leveling pad shall be provided as shown on the plans.
- D. Native foundation soil shall be compacted to 95% of standard Proctor or 90% of modified Proctor prior to placement of the leveling pad material.
- E. In-situ foundation soil shall be examined by the Engineer to ensure that the actual foundation soil strength meets or exceeds design strength specified in the Foundation Preparation Plan prepared by the contractor. Soil not meeting the required strength shall be removed and replaced with acceptable, compacted material at no additional cost to the owner.

3.3 RETAINING WALL EXCAVATION

- A. This work shall consist of the excavation of material whose removal is necessary for the construction of the SRW sections in accordance with the plans and requirements herein. Excavation shall include the construction and subsequent removal of all necessary.
- B. Prior to starting excavation operation at the wall site, clearing and grubbing shall be in accordance with 202. The Contractor shall clear and grub the area for the excavation in accordance with the limits shown on the plans. All timber, stumps, and debris shall be disposed of in accordance with 202.
- C. Where necessary for safety, the excavation shall be shored or braced in accordance with State and local safety standards. Excavation and related work shall be performed such that no portion of the wall is endangered by subsequent operations.

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- D. Where the excavation for the wall is adjacent to a traveled way, the method for shoring, sheeting, or bracing the excavation opening shall be approved before beginning the excavation. The Contractor shall submit 5 copies of drawings in accordance with 603.03.06 showing details of the proposed method of excavation protection.
- E. After the excavation for each wall location has been performed, the Contractor shall notify the Engineer. The aggregate leveling pad shall not be placed until the Engineer has approved the depth of the excavation and the foundation material.
- F. All sheeting and bracing shall be removed as the backfilling progresses.
- G. All material for backfill shall be subject to approval and shall be free from large or frozen lumps, wood, or other undesirable material. All backfill shall be compacted in accordance with 603 and 613.

3.4 LEVELING PAD PLACEMENT

- A. Leveling pad shall be placed as shown in the Foundation Preparation Plans and on the construction drawings
- B. Leveling pad shall be compacted to 95% of standard Proctor or 90% of modified Proctor to ensure a level, hard surface on which to place the first course of blocks. Pad shall be constructed to the proper elevation to ensure the final elevation shown on the plans.
- C. As part of the Foundation Preparation Plan, it is recognized that the Leveling Pad may be part of the design provided to improve foundation bearing pressures, reduce settlement, and provide stability for the SRW units. At a minimum, the leveling pad shall have a 6 inch minimum depth for walls under 8 feet in height and a 12 inch minimum depth for walls over 8 feet. Pad dimensions shall extend beyond the blocks in all directions to a distance at least equal to the depth of the pad or as designed by the wall manufacturer and per the Foundation Preparation Plan
- D. For steps and pavers, a minimum of 1" - 1 1/2" of free draining sand shall be screeded smooth to act as a placement bed for the steps or pavers.

3.5 WALL ERECTION

- A. The first course of wall units shall be placed on the prepared Leveling Pad with the aesthetic surface facing out and the front edges tight together. All units shall be checked for level and alignment as they are placed
- B. Ensure that units are in full contact with leveling pad. Proper care shall be taken to develop straight lines and smooth curves on base course as per wall layout.

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- C. The backfill in front and back of entire base row shall be placed and compacted to firmly lock them in place. Check all units again for level and alignment. All excess material shall be swept from top of units.
- D. Install next course of wall units on top of base row. Position blocks to be offset from seams of blocks below. Blocks shall be placed fully forward so knob and groove are engaged. Check each block for proper alignment and level. Backfill to 12 inch width behind block with free draining backfill. Spread backfill in uniform lifts not exceeding 8 inches. Employ methods using lightweight compaction equipment that will not disrupt the stability or batter of the wall. Hand-operated plate compaction equipment shall be used around the block and within 3 feet of the wall to achieve consolidation. Compact backfill to 95% of standard proctor (ASTM D 698, AASHTO T-99) density within 2% of its optimum moisture content.
- E. Install each subsequent course in like manner. Repeat procedure to the extent of wall height.
- F. Allowable construction tolerance at the wall face is 2 degrees vertically and 1 inch in 10 feet horizontally.
- G. SRW units placed in contact with the ground or covered by standing water shall have face discoloration removed by means of a chemical wash. SRW units shall be stored to minimize contact with the ground or being covered by standing water.
- H. Ground reinforcement shall be placed normal to the face of the wall, unless otherwise shown on the plans and shall be constructed in accordance with 304. Backfill shall be compacted in accordance with Part 3.5.
- I. All walls shall be installed in accordance with the KYTC Standard Specifications for Road and Bridge Construction, and where applicable, the local building codes and requirements.

3.6 BACKFILL PLACEMENT

- A. Backfill placement shall closely follow erection of each course of SRW units with or without ground reinforcement. Backfill shall be placed so as to avoid damage or disturbance to the wall materials or misalignment of the SRW units. Wall materials that become damaged or disturbed during backfill placement shall be removed and replaced or corrected as directed. All misalignment or distortion of the SRW units due to placement of backfill outside the limits described herein shall be corrected as directed.
- B. The work shall also include backfilling beyond the theoretical length of the ground reinforcement in accordance with the details shown on the plans and the disposal of surplus of unsuitable excavated materials as permitted.
- C. Structure granular backfill shall be compacted to 95% of the maximum dry density in accordance with AASHTO T 99. Compaction equipment shall be in accordance with 403. Density of the compacted aggregate will be determined in accordance with 302. If coarse aggregate No.8 backfill material is used, compaction shall consist of 4 passes with a vibratory

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roller, and 1 pass with the same roller in static mode. A vibratory roller shall be equipped with a variable amplitude system, a speed control device, and have a minimum vibration frequency of 1000 vibrations per min. A roller in accordance with 403 may be used. All displacement or rutting of the aggregate shall be repaired prior to placing subsequent material.

- D. The maximum loose lift thickness shall not exceed 8 in. (200 mm) except that lifts 3 ft (0.9 m) from the wall or closer shall not exceed 5 in. (125 mm) in loose thickness. This lift thickness shall be decreased if necessary, to obtain the specified density.
- E. Compaction within 3 ft (0.9 m) of the back face of the SRW units shall be achieved by means of a minimum of 5 passes with a lightweight mechanical tamper, roller, or vibratory system.
- F. At the end of each day's operation, the last level of backfill shall be sloped away from the SRW units. In addition, surface runoff from adjacent areas shall not be permitted to enter the wall construction site.
- G. Cutting or altering of the basic structural section of the ground reinforcing at the site will be prohibited, unless the cutting is preplanned and detailed on the approved design drawings. Cutting shall only be considered if adequate additional ground reinforcement is provided to produce the required ground reinforcement strength shown in the approved calculations.

3.7 METHOD OF MEASUREMENT

- A. There will be no measurement for any quantities associated with segmental retaining wall units. In the event of either additional work or deletions from the Contract Lump Sum bid, quantities will be measured as follows: segmental retaining wall units with or without ground reinforcement will be measured by the square yard (square meter) of wall surface area; erection of segmental retaining wall units will be measured by the square yard (square meter) of wall surface area; structure excavation common and structure excavation solid rock will be measured by the cubic yard (cubic meter) in accordance with 603.04 to the neat lines shown on the plans; and structure granular backfill .
- B. The measurement, included in the Contract Lump Sum bid, for concrete segmental retaining wall units and wall erection will be based on the neat line limits of the wall envelope shown on the plans and not that of the wall system supplier. The wall envelope limits will be considered to be the vertical distance from the top of the leveling pad to the top of the wall, and the horizontal distance from the beginning to the end of the leveling pad.
- C. Clearing and grubbing, compacted aggregate No. 57, and compacted aggregate No. 8 will not be measured. Geotextile materials, if used in accordance with Part 2.1, will not be measured.

3.8 BASIS OF PAYMENT

- A. All quantities associated with segmental retaining walls and foundation preparation will not be paid for separately but will be considered incidental to the Contract Lump Sum bid. In the event of either additional work or deletions from the Contract Lump Sum bid, quantities will

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be paid for or reimbursed as follows: segmental retaining wall units with or without ground reinforcement at the contract unit price per square yard of wall surface area; erection of segmental retaining wall units by the square yard of wall surface area; structure excavation common and structure excavation solid rock at the contract unit price per cubic yard in accordance with 603.05 to the neat lines shown on the plans; and structure granular backfill.

B. Payment by or reimbursement to 21st Century Parks, Inc. will be made under:

| Pay Item | Pay Unit Symbol |
|--|------------------------|
| Segmental Retaining Wall..... | SYS |
| Segmental Retaining Wall with Ground Reinforcement | SYS |
| Segmental Retaining Wall Erection | SYS |
| Structure Granular Backfill | CYS |

- C. The cost of aggregate, geotechnical testing, and settlement monitoring shall be included in the Contract Lump Sum bid.
- D. The cost of segmental retaining wall units including ground reinforcing, fasteners, repair or replacement of units damaged or removed due to backfill placement, and incidentals shall be included in the Contract Lump Sum bid.
- E. The cost of all labor and materials required to prepare the wall foundation, place the ground reinforcing, and erect the segmental retaining wall units shall be included in the Contract Lump Sum bid.
- F. The cost of performing the laboratory tests by an approved geotechnical laboratory for structural granular backfill shall be included in the Contract Lump Sum bid.
- G. The cost of all labor and materials for geotextile materials shall be included in the Contract Lump Sum bid.
- H. The cost of cutting or altering the ground reinforcing at the site shall be included in the Contract Lump Sum bid.
- I. The cost of all segmental retaining wall materials including segmental retaining wall units, compressive strength retesting if required, and incidentals shall be included in the Contract Lump Sum bid.
- J. The cost of clearing and grubbing, compacted aggregate No. 53, compacted aggregate No. 8, ground reinforcement, or replacement materials damaged during backfill placement if required, shall be included in the Contract Lump Sum bid.
- K. The cost of retesting or replacing failed segmental retaining wall units will be included in the Contract Lump Sum bid.

END OF SECTION 323223

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SECTION 329200 – HERBACEOUS SEEDING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Herbaceous Seeding, including furnishing and installing all herbaceous seed for the Planting Zones as specified in the Contract Documents, or as directed by the Owner's Representative.

B. Related Sections:

- 1. Division 31 Section "Site Clearing" for topsoil stripping and stockpiling.
- 2. Division 31 Section "Earthwork" for excavation, filling and backfilling, and rough grading.
- 3. Division 32 Section "Erosion Prevention and Sediment Control".
- 4. Division 32 Section "Native Exterior Plants around Bridges".
- 5. Division 32 Section "Live Branch Layering with Soil Lifts".
- 6. Division 32 Section "Buried Soil Riprap".
- 7. Division 32 Section "Coir Fiber Matting".

1.3 DEFINITIONS

- A. Finish Grade: Elevation of finished surface of planting soil.
- B. Manufactured Soil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.
- C. Planting Soil: Native or imported topsoil, manufactured topsoil, or surface soil modified to become topsoil; mixed with soil amendments.
- D. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill immediately beneath planting soil.
- E. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

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1.4 SUBMITTALS

- A. Certification of Native Seed: From seed vendor stating the botanical and common name and percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.
- B. Qualification Data: For qualified landscape Installer.
- C. Material Test Reports: For existing surface soil and imported topsoil.
- D. Planting Schedule: Indicating anticipated planting dates for each type of planting.
- E. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of native seeding during a calendar year. Submit before expiration of required initial maintenance periods.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful lawn and meadow establishment.
 - 1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when planting is in progress.
- B. Soil Testing Laboratory Qualifications: An independent laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.
- C. Topsoil Analysis: Furnish soil analysis by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; sodium absorption ratio; deleterious material; pH; and mineral and plant-nutrient content of topsoil.
 - 1. Report suitability of topsoil for plant growth.
- D. Preinstallation Conference: Conduct conference at Project site.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Seed: Deliver seed in original sealed, labeled, and undamaged containers.

1.7 PROJECT CONDITIONS

- A. Planting Restrictions: Plant during the following period. Coordinate planting period with initial maintenance periods to provide required maintenance from date of Substantial Completion.
 - 1. Spring Planting: March 15 – June 15.
 - 2. Fall Planting: September 15 – November 15.

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- B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit. Air temperature shall not be below 32 degrees Fahrenheit and soil shall not be frozen.

1.8 WARRANTY

- A. Special Warranty: Installer's standard form in which Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.

- 1. Failures include, but are not limited to, the following:

- a. Death and unsatisfactory growth, except for defects resulting from lack of adequate maintenance, neglect, abuse by Owner, or incidents that are beyond Contractor's control.

- 2. Warranty Periods from Date of Substantial Completion:

- a. Herbaceous Seeding: One year.

- 3. The Contractor shall maintain a minimum 85% aerial coverage of herbaceous seeding for the warranty period. This shall include necessary care and replacement to achieve the required coverage. Provide extended warranty for replaced plant materials; warranty period equal to original warranty period.

1.9 MAINTENANCE SERVICE

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

- 1. Herbaceous Seeding: 1 year from date of Substantial Completion.

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

PART 2 – PRODUCTS

2.1 SEED

- A. Herbaceous Seed:

- 1. Herbaceous Seed shall consist of seed varieties specified in the composition and planting schedules for all Zones.

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2. Seed shall be certified that the Pure Live Seed (PLS) percentage is equal to or greater than that which is specified on the Plant Schedules. If the PLS is less than specified, the Contractor shall increase the seeding rate to compensate for the PLS difference at his/her own expense.
3. All seed and seed varieties shall be free from State and Federal prohibited noxious weed seeds.

2.2 TOPSOIL

- A. Topsoil: Topsoil shall be salvaged from on site or, if not available, shall have properties similar to native topsoil. General parameters are as follows: ASTM D 5268, pH range of 5.5 to 7, 2 to 6 percent organic material content; shall be natural, surface soil in a friable condition and containing less than 3% subsoil. The topsoil shall be free of hardpan material, stones and clods larger than ½ inch in diameter, sticks, tree or shrub roots, debris, toxic substances (ie. residual herbicides) and other material detrimental plant growth. The area and the topsoil shall be free of plant or plant parts of undesirable plants such as, but not limited to, Bermuda Grass, nut sedge, mugwort, Johnson grass, quack grass, Canada thistle or noxious weeds as set forth by the State or in the Federal Seed Act.
- B. Before delivery the contractor shall notify the Owner's Representative of location of all sources of the topsoil and furnish the Owner's Representative a certified report from the agricultural experiment station or approved agricultural laboratory of an analysis performed not more than 60 days prior to the date of submission. The topsoil shall be certified to meet the following requirements:
 1. Shall be a natural, original surface soil of a sandy loam texture similar to native soils on site.
 2. Shall have at least 2%, but no more than 6% organic matter.
 3. Soil pH shall be 5.5 to 7 inclusive unless otherwise specified.
 4. Soil salinity by electrical conductivity measurement shall not exceed 600 parts per million (ppm) as determined by Black, Editor "Method of Soil Analysis", Part 2, published by the American Society of Agronomy, 1965.
 5. The soil nutrient level shall be between 70-265 lbs/acre of magnesium, 65-205 lbs/acre of phosphorous (P2O5), and 85-320 lbs/acre of potassium (K2O).
- C. Topsoil which has been synthesized by blending materials which individually do not meet the requirements of this specification will not be accepted even though the resulting blend meets the organic matter, mechanical analysis, Ph and soluble salts requirements.
- D. Topsoil shall be approved by the Owner's Representative before mixing. The Owner reserves the right to inspect and sample all topsoil before mixing. These inspections will be made without cost to the Contractor.
 1. Topsoil Source: Reuse surface soil stockpiled on-site. Verify suitability of stockpiled surface soil to produce topsoil. Clean surface soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.

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- a. Supplement with imported or manufactured topsoil from off-site sources when quantities are insufficient. Obtain topsoil displaced from naturally well-drained construction or mining sites that is similar to on-site topsoil.
- 2.3 INORGANIC SOIL AMENDMENTS
- A. Lime: Limestone shall not be applied to any areas receiving herbaceous seeding.
- 2.4 FERTILIZER
- A. Herbaceous seeding areas shall not be fertilized.
- 2.5 COIR FIBER MATTING
- A. Coir Fiber Matting shall be used in accordance with Section "Coir Fiber Matting".
- 2.6 WATER
- A. Water used in the establishment or caring of plants and seed shall be free from any substance that is injurious to plant life.

PART 3 – EXECUTION

- 3.1 EXAMINATION
- A. Examine areas to receive herbaceous seeding for compliance with requirements and other conditions affecting performance.
 - B. Proceed with installation only after unsatisfactory conditions have been corrected.
- 3.2 PREPARATION
- A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.
 - 1. Protect grade stakes set by others until directed to remove them.
 - B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
- 3.3 SOIL PREPARATION
- A. Limit subgrade preparation to areas to be planted.

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- B. Newly Graded Subgrades except Joint Planting Areas: In all planting zones except Joint Planting, loosen subgrade to a minimum depth of 6 inches (150 mm). Remove stones larger than 1 inch (25 mm) in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
 - 1. Thoroughly blend planting soil mix off-site before spreading or spread topsoil.
 - 2. Spread planting soil mix to a minimum depth of 6 inches (150 mm) but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
 - a. Spread approximately 1/2 the thickness of planting soil mix over loosened subgrade. Mix thoroughly into top 4 inches (100 mm) of subgrade. Spread remainder of planting soil mix.
- C. Joint Planting Areas: Follow Section "Buried Soil Riprap". Spread planting soil mix to a minimum depth of 8 inches but not less than required to meet finish grades after light rolling or natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
- D. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch (13 mm) of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.
- E. Moisten prepared areas before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- F. Before planting, restore areas if eroded or otherwise disturbed after finish grading.

3.4 SEEDING

- A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph (8 km/h). Evenly distribute seed by sowing equal quantities in two directions at right angles to each other. All seeding equipment shall be calibrated before application to the satisfaction of the Owner's Representative so that the material is applied accurately and evenly to avoid misses and overlaps. Seed installed by a broadcast spreader shall be capable of placing seed at the specified rate.
 - 1. Do not use wet seed or seed that is moldy or otherwise damaged.
 - 2. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.
- B. Sow seeds in accordance with the planting plans and schedules. The herbaceous plant seed mix is specified on the composition and planting schedules. Areas not disturbed shall not be seeded.
- C. Seed shall be applied within the top ¼ inch of the soil. The Contractor shall maximize the seed/soil contact by firming soil around the seed with a cultipacker, other similar equipment, or by dragging the surface with chain link fence.

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- D. Immediately after seeding, the site shall be watered lightly but thoroughly so that the top 4 inches of soil is saturated
- E. Apply clean straw mulch at a rate of two tons per acre within 24 hours after completing seeding operations.
- F. Protect seeded areas by spreading coir fiber matting after seeds have been sowed and clean straw mulch has been placed in accordance with Section "Coir Fiber Matting".

3.5 HERBACEOUS SEEDING MAINTENANCE

- A. Maintain and establish seeded areas by watering, weeding, trimming, replanting, and other operations. Roll, regrade, and reseed bare or eroded areas and recover with clean straw mulch and coir matting to produce a uniformly smooth surface. Provide materials and installation the same as those used in the original installation.
 - 1. In areas where matting has been disturbed by wind or construction or maintenance operations, add new matting and anchor as required to prevent displacement.
- B. Watering: Provide temporary watering equipment to convey water from watering trucks and to keep grass uniformly moist to a depth of 4 inches (100 mm).
 - 1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Provide watering to avoid walking over muddy or newly planted areas.
 - 2. Water with fine spray at a minimum rate of 1 inch (25 mm) per week unless rainfall precipitation is adequate.
- C. Weed Control: Contractor shall be responsible for eradicating weeds from herbaceous seeding areas for 6 weeks after planting.

3.6 SATISFACTORY HERBACEOUS GROWTH

- A. Herbaceous seed installations shall meet the following criteria as determined by Owner's Representative:
 - 1. Satisfactory Seeded Areas: At end of maintenance period, a healthy, uniform, close stand of rye species has been established, free of weeds and surface irregularities.
- B. Use specified materials to reestablish areas that do not comply with requirements and continue maintenance until coverage is satisfactory.

3.7 CLEANUP AND PROTECTION

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

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- B. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after cover is established.
- C. Remove nondegradable erosion-control measures after establishment period.

END OF SECTION 329200

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SECTION 329201 – LAWN AND MEADOW MIXES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Mown Lawn Seeding.
 - 2. Meadow Mix Seeding.
- B. Related Sections:
 - 1. Division 31 Section "Site Clearing" for topsoil stripping and stockpiling.
 - 2. Division 31 Section "Earthwork" for excavation, filling and backfilling, and rough grading.
 - 3. Division 32 Section "Erosion prevention and sediment control".
 - 4. Division 32 Section "Planting".

1.3 DEFINITIONS

- A. Finish Grade: Elevation of finished surface of planting soil.
- B. Manufactured Soil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.
- C. Planting Soil: Native or imported topsoil, manufactured topsoil, or surface soil modified to become topsoil; mixed with soil amendments.
- D. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill immediately beneath planting soil.
- E. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated including sample of open weave jute mat.
- B. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture stating the botanical and common name and percentage by weight of each species and

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variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

- C. Qualification Data: For qualified landscape Installer.
- D. Product Certificates: For soil amendments and fertilizers, from manufacturer.
- E. Material Test Reports: For existing surface soil and imported topsoil.
- F. Planting Schedule: Indicating anticipated planting dates for each type of planting.
- G. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of lawns and meadows during a calendar year. Submit before expiration of required initial maintenance periods.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful lawn and meadow establishment.
 - 1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when planting is in progress.
- B. Soil-Testing Laboratory Qualifications: An independent laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.
- C. Topsoil Analysis: Furnish soil analysis by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; sodium absorption ratio; deleterious material; pH; and mineral and plant-nutrient content of topsoil.
 - 1. Report suitability of topsoil for lawn growth. State-recommended quantities of nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory topsoil.
- D. Preinstallation Conference: Conduct conference at Project site.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Seed: Deliver seed in original sealed, labeled, and undamaged containers.

1.7 PROJECT CONDITIONS

- A. Planting Restrictions: Plant during the following period. Coordinate planting period with initial maintenance periods to provide required maintenance from date of Substantial Completion.
 - 1. Spring Planting: March 15 – June 15.

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2. Fall Planting: September 1 – November 1.

B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit.

1.8 MAINTENANCE SERVICE

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

1. Seeded Lawns and Meadows: 1 year from date of Substantial Completion.

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

PART 2 - PRODUCTS

2.1 SEED

A. Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.

B. Seed Species: Seed species as follows, with not less than 95 percent germination, not less than 85 percent pure seed, and not more than 0.5 percent weed seed:

1. Mown Lawn: Refer to general notes / planting schedule for mown lawn seed mix.

2. Meadow and Wildflower Mix: Refer to general notes / planting schedule for meadow and wildflower seed mixes.

2.2 TOPSOIL

A. Topsoil: ASTM D 5268, pH range of 5.5 to 7, a minimum of 6 percent organic material content; shall be natural, surface soil in a friable condition and containing less than 3% subsoil. The topsoil shall be free of hardpan material, stones and clods larger than ½ inch in diameter, sticks, tree or shrub roots, debris, toxic substances (ie. residual herbicides) and other material detrimental plant growth. The area and the topsoil shall be free of plant or plant parts of undesirable plants such as, but not limited to, Bermuda Grass, nut sedge, mugwort, Johnson grass, quack grass, Canada thistle or noxious weeds as set forth in the Federal Seed Act.

B. Before delivery the contractor shall notify the Architect of location of all sources of the topsoil and furnish the Architect a certified report from the agricultural experiment station or

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approved agricultural laboratory of an analysis performed not more than 60 days prior to the date of submission. The topsoil shall be certified to meet the following requirements:

1. Shall be a natural, original surface soil of a sandy loam texture with a mechanical analysis of 60-65% sand, 15-25% silt and 10-15% clay.
 2. Shall have at least 2%, but no more than 6% organic matter.
 3. Soil pH shall be 5.5 to 7 inclusive unless otherwise specified.
 4. Soil salinity by electrical conductivity measurement shall not exceed 600 parts per million (ppm) as determined by Black, Editor "Method of Soil Analysis", Part 2, published by the American Society of Agronomy, 1965.
 5. The soil nutrient level shall be between 70-265 lbs/acre of magnesium, 65-205 lbs/acre of phosphorous (P₂O₅), and 85-320 lbs/acre of potassium (K₂O).
- C. Topsoil which has been synthesized by blending materials which individually do not meet the requirements of this specification will not be accepted even though the resulting blend meets the organic matter, mechanical analysis, Ph and soluble salts requirements.
- D. Topsoil shall be approved by the Architect before mixing. The Owner reserves the right to inspect and sample all topsoil before mixing. These inspections will be made without cost to the Contractor.
1. Topsoil Source: Reuse surface soil stockpiled on-site. Verify suitability of stockpiled surface soil to produce topsoil. Clean surface soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.
 - a. Supplement with imported or manufactured topsoil from off-site sources when quantities are insufficient. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches (100 mm) deep; do not obtain from agricultural land, bogs or marshes.

2.3 INORGANIC SOIL AMENDMENTS

- A. Lime: ASTM C 602, agricultural limestone containing a minimum of 80 percent calcium carbonate equivalent and as follows:
1. Class: O, with a minimum of 95 percent passing through No. 8 (2.36-mm) sieve and a minimum of 55 percent passing through No. 60 (0.25-mm) sieve.
- B. Sulfur: Granular, biodegradable, containing a minimum of 90 percent sulfur, with a minimum of 99 percent passing through No. 6 (3.35-mm) sieve and a maximum of 10 percent passing through No. 40 (0.425-mm) sieve.
- C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.

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- D. Aluminum Sulfate: Commercial grade, unadulterated.
- E. Perlite: Horticultural Perlite, soil amendment grade.
- F. Agricultural Gypsum: Finely ground, containing a minimum of 90 percent calcium sulfate.
- G. Sand: Clean, washed, natural, free of toxic materials.

2.4 ORGANIC SOIL AMENDMENTS

- A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1/2-inch (12.5-mm) sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:
 - 1. Organic Matter Content: 50 to 60 percent of dry weight.
 - 2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.
- B. Peat: Finely divided or granular texture, with a pH range of 6 to 7.5, containing partially decomposed moss peat, native peat, or reed-sedge peat and having a water-absorbing capacity of 1100 to 2000 percent.
- C. Wood Derivatives: Decomposed, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture, free of chips, stones, sticks, soil, or toxic materials.
- D. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.

2.5 PLANTING ACCESSORIES

- A. Selective Herbicides: EPA registered and approved, of type recommended by manufacturer for application.

2.6 FERTILIZER

- A. Bonemeal: Commercial, raw or steamed, finely ground; a minimum of 4 percent nitrogen and 20 percent phosphoric acid.
- B. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
 - 1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.

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- C. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
 - 1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.

2.7 MULCHES

- A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.
- B. Fiber Mulch: Biodegradable, dyed-wood, cellulose-fiber mulch; nontoxic; free of plant-growth or germination inhibitors; with a maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.
- C. Nonasphaltic Tackifier: Colloidal tackifier recommended by fiber-mulch manufacturer for slurry application; nontoxic and free of plant-growth or germination inhibitors.

2.8 PLANTING SOIL MIX

- A. Planting Soil Mix: Contractor shall mix topsoil with the organic and inorganic soil amendments and fertilizers as determined by laboratory soil testing to achieve a topsoil planting mix meeting requirements listed in paragraph 2.2, Topsoil.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive grass for compliance with requirements and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.
 - 1. Protect adjacent and adjoining areas from hydroseeding and hydromulching overspray.
 - 2. Protect grade stakes set by others until directed to remove them.
- B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

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3.3 GRASS PREPARATION

- A. Limit grass subgrade preparation to areas to be planted.
- B. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 6 inches (150 mm). Remove stones larger than 1/2 inch (12 mm) in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
 - 1. Thoroughly blend planting soil mix off-site before spreading or spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil mix.
 - a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
 - b. Mix lime with dry soil before mixing fertilizer.
 - 2. Spread planting soil mix, in areas to be seeded with lawn and athletic field mix, to a depth of 6 inches (150 mm) but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
 - a. Spread approximately 1/2 the thickness of planting soil mix over loosened subgrade. Mix thoroughly into top 4 inches (100 mm) of subgrade. Spread remainder of planting soil mix.
- C. Unchanged Subgrades: Meadows are to be planted in areas unaltered or undisturbed by excavating, grading, or surface-soil stripping operations, prepare surface soil as follows:
 - 1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.
 - 2. Loosen surface soil to a depth of at least 6 inches (150 mm). Apply soil amendments and fertilizers according to planting soil mix proportions and laboratory testing requirements and mix thoroughly into top 6 inches (150 mm) of soil. Till soil to a homogeneous mixture of fine texture.
 - 3. Remove stones larger than 1 inch (25 mm) in any dimension and sticks, roots, trash, and other extraneous matter.
 - 4. Legally dispose of waste material, including grass, vegetation, and turf, off Owner's property.
- D. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch (13 mm) of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.
- E. Moisten prepared lawn areas before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- F. Before planting, restore areas if eroded or otherwise disturbed after finish grading.

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3.4 SEEDING

- A. Mown Lawn Seeding - Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph (8 km/h). Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
 - 1. Do not use wet seed or seed that is moldy or otherwise damaged.
 - 2. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.
- B. Meadow Mix Seeding – Sow seeds with drill seeder specially adapted for native seed, directly through the existing dead plant material. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
 - 1. Do not use wet seed or seed that is moldy or otherwise damaged.
- C. Sow seeds at the following rates:
 - 1. Mown Lawn – 100 lbs per acre
 - 2. Meadows and Wildflowers – 15 lbs per acre
- D. Rake seed lightly into top 1/8 inch (3 mm) of soil, roll lightly, and water with fine spray.
- E. Protect seeded areas with slopes not exceeding 1:6 by spreading straw mulch. Spread uniformly at a minimum rate of 2 tons/acre (42 kg/92.9 sq. m) to form a continuous blanket 1-1/2 inches (38 mm) in loose depth over seeded areas. Spread by hand, blower, or other suitable equipment.
 - 1. Anchor straw mulch by crimping into soil with suitable mechanical equipment.
- F. Protect seeded areas from hot, dry weather or drying winds by applying compost mulch or peat mulch within 24 hours after completing seeding operations. Soak areas, scatter mulch uniformly to a depth of 1/4 inch, and roll surface smooth.

3.5 LAWN AND MEADOW MAINTENANCE

- A. Maintain and establish grass by watering, fertilizing, weeding, trimming, replanting, and other operations. Roll, regrade, and reseed bare or eroded areas and remulch to produce a uniformly smooth grass surface. Provide materials and installation the same as those used in the original installation.
 - 1. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
- B. Watering: Provide temporary watering equipment to convey water from watering trucks and to keep grass uniformly moist to a depth of 4 inches (100 mm).
 - 1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Provide watering to avoid walking over muddy or newly planted areas.

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2. Water grass with fine spray at a minimum rate of 1 inch (25 mm) per week unless rainfall precipitation is adequate.
- C. Weed Control: Contractor shall be responsible for eradicating weeds from grass seeding areas for 2 years after planting in areas inside the signature Trail in the Egg Lawn and 6 weeks after planting for the rest of the site.
- D. Mowing:
 1. Mown Lawns: Contractor shall mow all lawn areas a single time to a height of 4 to 6 inches.
 2. Meadow and Wildflower Areas: Contractor shall mow all meadow and wildflower areas a single time during the winter to a height of 4 to 6 inches to favor forb protection and wildlife, and again in summer to a height of 4 to 6" to increase grass production and control weedy vegetation.

3.6 SATISFACTORY GRASS

- A. Grass installations shall meet the following criteria as determined by the Architect:
 1. Satisfactory Seeded Grass: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. (0.92 sq. m) and bare spots not exceeding 5 by 5 inches (125 by 125 mm).
- B. Use specified materials to reestablish grasses that do not comply with requirements and continue maintenance until lawns are satisfactory.

3.7 CLEANUP AND PROTECTION

- A. Promptly remove soil and debris, created by grass work, from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- B. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after lawn is established.
- C. Remove nondegradable erosion-control measures after grass establishment period.

END OF SECTION 329200

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SECTION 329210 - EROSION PREVENTION AND SEDIMENTATION CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Chapter 12 - Erosion Prevention and Sediment Control- of the Louisville and Jefferson County Metropolitan Sewer District (MSD) Design Manual, latest edition.
- C. Section 2 - Site Preparation, Erosion Prevention and Sediment Control -of the Louisville and Jefferson County Metropolitan Sewer District (MSD) Standard Specifications, latest edition.
- D. Louisville and Jefferson County Metropolitan Sewer District (MSD) Standard Drawings, latest edition.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Erosion prevention measures.
 - 2. Sediment Control measures.
- B. Related Sections include the following:
 - 1. Section 312000 "Earth Moving" for earthwork construction measures.
 - 2. Division 32 "Exterior Improvements" Sections for finish grading, including placing and preparing topsoil for planting and seeding materials.

1.3 DESCRIPTION OF WORK

- A. Erosion Prevention and sediment control:
 - 1. Temporary Soil Stabilization: This Work shall consist of seedbed preparation, furnishing and placing seed, mulch, netting and staples, erosion control blankets, and caring for such areas until acceptance. The Contractor shall remove the netting and staples, 30 to 45 days after installation, or after the grass has become established.
 - 2. Temporary soil stabilization shall be used in the following circumstances:

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- a. In non-paved areas, rough grading and permanent soil stabilization or temporary soil stabilization shall be maintained. In no case shall the time between completion of construction activities and the completion of permanent or temporary stabilization exceed 14 calendar days.
 - b. Where construction operations are temporarily suspended for 14 days or longer and permanent soil stabilization is not practical.
 - c. When an immediate cover would be desirable to minimize erosion, siltation, or pollution of any area.
3. Sediment Control: This Work shall consist of the temporary sediment control measures to be performed during the life of the Project to control water pollution caused by erosion of exposed soil. Sediment control facilities shall be properly installed and maintained per the details and the Erosion Prevention and Sediment Control Plan. Controls found to be inadequate must be altered to maintain sediment control

PART 2 - PRODUCTS

2.1 EROSION PREVENTION AND SEDIMENT CONTROL MATERIALS

- A. Provide materials complying with MSD's Design Manual and Standard Specifications and Best Management Practices
1. Topsoil: Topsoil must meet the requirements set forth in Section 312000 "Earth Moving."
 2. Temporary Seed: Seed used for temporary seeding may be accepted on the basis of purity and germination values shown on the seed bag. The Work of temporary seeding of erosive earth areas shall be done promptly at the location and times as directed by the Architect/Owner. 100% annual rye shall be used for temporary seeding.
 3. Straw Mulch.
 4. Silt Fence.
 5. Bags Filled with Stone.
 6. Stone Check Dams.
 7. Stabilized Construction Entrance.

PART 3 - EXECUTION

3.1 EROSION PREVENTION

- A. Temporary soil Stabilization
1. Preparing the Seed Bed: Areas to be temporarily seeded shall require the preparation of a seedbed only when the soil surface is desiccated, is non-uniform, or contains clods or large stones. Disturbance of the soil surface by whatever means that is practicable, such as disking, to create a 2 inch loose and roughened condition capable of retaining the seed and mulch will be required when the soil surface is desiccated or non-uniform.

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Clods and stones larger than ½-inch shall be removed. The preparation of a seedbed will not be required when the soil surface is in an acceptable condition from the normal grading operations.

2. Seeding: Temporary seeding shall be permitted only during the periods indicated in the table below. In order to stabilize erodible areas with vegetation through the winter, temporary seeding must be completed no later than October 31. Working the soil to cover the seed will not be required. Temporary seeding shall be sown at the appropriate rate of 3 pounds per 1000 per square feet.

| <u>Work Item</u> | <u>Accepted Work Interval</u> |
|---|--------------------------------|
| Temporary seeding with Annual Rye | March 1 through November 1 |
| Temporary seeding with Winter Wheat or Rye Grain | September 1 through November 1 |

- B. Protection: All seeded areas shall be promptly protected with straw mulch or wood cellulose fiber mulch. The materials shall be uniformly applied and anchored to the seeded areas.
- C. Install Erosion Control Blanket (ECB) on the fill and cut slopes at locations shown on the drawings. These slopes shall be finished graded, seeded and ECB installed as soon as possible after construction has started.
- D. Dormant Season Stabilization: Areas requiring temporary stabilization during the period of November through February, when seeding is not permitted, shall receive only an application of straw mulch field held in place by crimping or netting. The approximate rate of application of the straw mulch shall be 3 tons per acre.

3.2 SEDIMENT CONTROL

- A. General: The Contractor shall exercise every reasonable precaution at all times to prevent water pollution by the deposition of sediment in streams, ditches, and storm sewers. He shall conduct and schedule his operations so as to avoid or minimize the muddying or siltation of areas adjacent to the construction site including streets, storm sewers, etc. The Contractor shall comply with the applicable provisions of KRS Chapters 220 and 224 of the State Water Pollution Control Laws and other applicable statutes relating to the prevention or abatement of water pollution.
- B. Silt Fence: Where called for on the Erosion Prevention and Sediment Control Plan or the Project Plans and Specifications, silt fence shall be installed, inspected, maintained, and removed in accordance with the requirements.
 1. Installation: Silt Fence shall be installed at the locations shown on the Erosion Prevention and Sediment Control Plan prior to the start of construction on areas that drain to the fence location.

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2. Inspection and Maintenance: Silt fence shall be inspected and maintained.
 3. Removal. Silt fences temporarily removed to facilitate construction activities shall be replaced immediately following completion of such activity.
- C. Stone Bag Inlet Protection for Drop Inlets: Stone bag inlet protection for drop inlets shall be constructed in accordance with the Details.
1. Installation: Stone Bag inlet protection shall be installed at the locations shown on the Erosion Prevention and Sediment Control Plan prior to the start of construction activities on areas that drain to the inlet, or immediately following the time at which a new inlet can receive runoff from a disturbed area.
 2. Inspection and Maintenance: Stone bag inlet protection shall be inspected and maintained after each rainfall and once a week.
 3. Removal: Remove stone bag inlet protection after grass has reached a length of three inches. Inlet protection temporarily removed to facilitate construction activities shall be replaced immediately following completion of such activity.
- D. Stone Bag Check Dam in Small Ditch: Stone bag check dams shall be constructed in accordance with the Details.
1. Installation: Stone bag check dams shall be installed at the locations shown on the Erosion Prevention and Sediment Control Plan as the small ditches are constructed.
 2. Inspection and Maintenance: Stone bag check dams shall be inspected and maintained after each rainfall and once a week.
 3. Removal: Remove stone bag check dam after grass has been fully established in the ditches. Stone bags temporarily removed to facilitate construction activities shall be replaced immediately following completion of such activity.
- E. Ditch Check: Rock ditch checks shall be constructed in accordance with the Details.
1. Installation: Rock ditch checks shall be installed at the locations shown on the Erosion Prevention and Sediment Control Plan in existing ditches or as the ditches are constructed.
 2. Inspection and Maintenance: Rock ditch checks shall be inspected and maintained after each rainfall and once a week.
 3. Removal: Remove rock ditch checks after grass has been fully established in the ditches. Rock ditch checks temporarily removed to facilitate construction activities shall be replaced immediately following completion of such activity.
- F. Winged & Straight Headwall Inlet Protection: Winged & straight headwall inlet protection for headwalls shall be constructed in accordance with the Details.
1. Installation: Winged & straight headwall inlet protection shall be installed at the locations shown on the Erosion Prevention and Sediment Control Plan prior to the start

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of construction activities on existing headwalls and right after new headwalls are constructed.

2. Inspection and Maintenance: Winged & straight headwall inlet protection shall be inspected and maintained after each rainfall and once a week.
3. Removal: Remove winged & straight headwall inlet protection after grass has reached a length of three inches. Headwall inlet protection temporarily removed to facilitate construction activities shall be replaced immediately following completion of such activity.

G. Stabilized Construction Entrance shall be constructed in accordance with the Details

1. Installation: The entrances shall be installed at the locations shown on the Erosion Prevention and Sediment Control Plan prior to the start of any construction. The contractor shall obtain approval from MSD's inspector prior to installing the entrance at a different location.
2. Inspection and Maintenance: The entrance shall be maintained.
3. Removal: Should the entrance be temporarily removed to facilitate construction activities, it shall be replaced immediately following completion of such activity.

END OF SECTION 329210

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SECTION 329300 – NATIVE EXTERIOR PLANTS AROUND BRIDGES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Trees.
- 2. Shrubs.

B. Related Sections:

- 1. Division 31 Section "Site Clearing" for protection of existing trees and plantings, topsoil stripping and stockpiling, and site clearing.
- 2. Division 31 Section "Earthwork" for excavation, filling, and rough grading and for subsurface aggregate drainage and drainage backfill materials.
- 3. Division 32 Section "Coir Fiber Matting" for matting.
- 4. Division 32 Section "Herbaceous Seeding" for seeding.
- 5. Division 32 Section "Buried Soil Riprap" for joint planting.

1.3 DEFINITIONS

- A. Backfill: The earth used to replace or the act of replacing earth in an excavation.
- B. Container-Grown Stock: Healthy, vigorous, well-rooted exterior plants grown in a container with well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of exterior plant required.
- C. Finish Grade: Elevation of finished surface of planting soil.
- D. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.
- E. Multi-Stem: Where three or more main stems arise from the ground from a single root crown or at a point right above the root crown.

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- F. Planting Soil: Native or imported topsoil, manufactured topsoil, or surface soil modified to become topsoil; mixed with soil amendments.
- G. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill, before placing planting soil.
- H. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Qualification Data: For qualified landscape Installer.
- C. Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:
 - 1. Manufacturer's certified analysis for standard products.
 - 2. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.
- D. Material Test Reports: For existing surface soil and imported topsoil.
- E. Planting Schedule: Indicating anticipated planting dates for exterior plants.
- F. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of exterior plants during a calendar year. Submit before expiration of required maintenance periods.
- G. Warranty: Sample of special warranty.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful establishment of exterior plants.
 - 1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when planting is in progress.
- B. Soil-Testing Laboratory Qualifications: An independent laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.
- C. Topsoil Analysis: Furnish soil analysis by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; deleterious material; pH; and mineral and plant-nutrient content of topsoil.

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1. Report suitability of topsoil for plant growth.
- D. Provide quality, size, genus, species, and variety of exterior plants indicated, complying with applicable requirements in ANSI Z60.1, "American Standard for Nursery Stock."
- E. Tree and Shrub Measurements: Measure according to ANSI Z60.1 with branches and trunks or canes in their normal position. Do not prune to obtain required sizes. Take caliper measurements 6 inches above the ground for trees up to 4-inch caliper size, and 12 inches above the ground for larger sizes. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip-to-tip.
- F. Observation: Owner's Representative may observe trees and shrubs either at place of growth or at site before planting for compliance with requirements for genus, species, variety, size, and quality. Owner's Representative retains right to observe trees and shrubs further for size and condition of balls and root systems, insects, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site. Owner's Representative shall inspect and approve the biodegradable tree shelters.
- G. Preinstallation Conference: Conduct conference at Project site.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver exterior plants freshly dug.
- B. Do not prune trees and shrubs before delivery except as approved by Owner's Representative. Protect bark, branches, and root systems from sun scald, drying, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of exterior plants during delivery. Do not drop exterior plants during delivery and handling.
- C. Handle planting stock by root ball.
- D. Deliver exterior plants after preparations for planting have been completed and install immediately. If planting is delayed more than six hours after delivery, set exterior plants and trees in shade, protect from weather and mechanical damage, and keep roots moist.
 1. Do not remove container-grown stock from containers before time of planting.
 2. Water root systems of exterior plants stored on-site with a fine-mist spray. Water as often as necessary to maintain root systems in a moist condition.

1.7 PROJECT CONDITIONS

- A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.
 1. Spring Planting: March 15 - May 30.

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2. Fall Planting: September 15 – November 30.

- B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed according to manufacturer's written instructions and warranty requirements.
- C. Coordination with Permanent Native Seeding: Plant trees and shrubs after finish grades are established and after seeding, straw mulching, and matting unless otherwise acceptable to Owner's Representative. When planting trees and shrubs, promptly repair damage to seeded and matted areas caused by planting operations.

1.8 WARRANTY

- A. Special Warranty: Installer's standard form in which Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.

1. Failures include, but are not limited to, the following:

- a. Death and unsatisfactory growth, except for defects resulting from lack of adequate maintenance, neglect, abuse by Owner, or incidents that are beyond Contractor's control.
- b. Structural failures including plantings falling or blowing over.

2. Warranty Periods from Date of Substantial Completion:

- a. Trees and Shrubs: One year.

3. Include the following remedial actions as a minimum:

- a. Remove dead exterior plants immediately. Replace immediately unless required to plant in the succeeding planting season.
- b. Replace exterior plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
- c. A limit of one replacement of each exterior plant will be required except for losses or replacements due to failure to comply with requirements.
- d. Provide extended warranty for replaced plant materials; warranty period equal to original warranty period.

1.9 MAINTENANCE SERVICE

- A. Initial Maintenance Service for Trees and Shrubs: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after each area is planted and continue until plantings are acceptably healthy and well established, but for not less than maintenance period below.

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1. Maintenance Period: 1 year after completion, final inspection and approval of the planting.
- B. Remove all tags, labels, strings and wire from the plant materials, unless otherwise directed by the Owner's Representative.
- C. It will be the Contractor's responsibility to supply water if there is none available on the site. Any costs associated with supplying water shall be the responsibility of the Contractor.

PART 2 - PRODUCTS

2.1 TREE AND SHRUB MATERIAL

- A. General: Furnish nursery-grown trees and shrubs complying with ANSI Z60.1, with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock free of disease, insects, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.
- B. Provide trees and shrubs of sizes, grades, and container sizes complying with ANSI Z60.1 for types and form of trees and shrubs required. Trees and shrubs of a larger size may be used if acceptable to Owner's Representative, with a proportionate increase in size of roots or balls.
- C. All plant material shall conform to the current issue of the American Standard for Nursery Stock published by the American Association of Nurserymen.
- D. Plant materials must be selected from certified nurseries that have been inspected by state and/or federal agencies. Nursery inspection certificates shall be furnished to the Owner's Representative upon request.
- E. The nursery supply source shall certify that the origin of the seeds from which the trees and shrubs were produced is from USDA Hardiness Zone 6, east of the Mississippi River.
- F. Plant material collected from the wild is prohibited.
- G. Container grown stock shall have been grown in a container long enough for the root system to have developed sufficiently to hold its soil. Roots shall visibly extend to the inside face of the growing container. All container grown plants shall be grouped and kept moist until they are planted.
- H. The Owner's Representative may reject plants damaged in handling or transportation.
- I. No plants shall be installed unless the Owner's Representative approves both the condition of the plantings and the process of installation.

2.2 SUBSTITUTE PLANT MATERIAL

- A. Prior to NOTICE-TO-PROCEED, the Owner's Representative must approve all plant substitutions.

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- B. If a substitute is selected, it must be native to the Kentucky Outer Bluegrass Region and of the same size, value, and quality as the original plant.

2.3 WATER

Water used in the establishment or caring of plants and seed shall be free from any substance that is injurious to plant life.

2.4 TOPSOIL

- A. Topsoil: ASTM D 5268, pH range of 5.5 to 7, 2 to 6 percent organic material content; free of stones 1 inch or larger in any dimension and other extraneous materials harmful to plant growth.

1. Topsoil Source: Reuse surface soil stockpiled on-site. Verify suitability of stockpiled surface soil to produce topsoil. Clean surface soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.

- a. Supplement with imported or manufactured topsoil from off-site sources when quantities are insufficient. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches deep; do not obtain from agricultural land, bogs or marshes.

2.5 FERTILIZER

- A. Plant fertilizer is to be applied only to containerized plants. The Contractor shall use organic fertilizers in lieu of petroleum based fertilizers. Suitable products that are commercially available are marketed and certified as 'organic' or 'natural' fertilizers. Organic materials shall include such items as; sea grasses/kelp, rock powder, bone meal, whey, bean meal, blood meal, composted manure, etc. Product nutrient content shall be identified in the standard form of Nitrogen (N), Phosphorous (P) and Potassium (K) ratios. Fertilizer nutrient content shall be 5-10-10 based on soil nutrient requirements derived from site soil tests. The application rate should be 400 lbs. per acre. Any proposed substitution to this nutrient content must be approved by the Owner's Representative.

2.6 MYCORRHIZAL FUNGI

- A. Mycorrhizal fungi applied to trees and shrubs shall consist of live spores of both endo- and ectomycorrhizal fungi.

2.7 MULCH

- A. Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of shredded hardwood or shredded bark [Wood and bark chips].

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2.8 PLANTING SOIL MIX

- A. Planting Soil Mix: Mix topsoil with the soil amendments as directed by the Owner's Representative to produce satisfactory planting soil based on tests of imported and existing soils.

2.9 BIODEGRADABLE TREE SHELTERS

- A. Tree shelters installed to protect trees and shrubs from herbivory shall be constructed of 100% biodegradable wood or fiber materials such as BioBark™ or approved similar and shall be 36 inches tall.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive exterior plants for compliance with requirements and conditions affecting installation and performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities, and lawns and existing exterior plants from damage caused by planting operations.
- B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
- C. For Joint Planting areas (Planting Zone B), install 18-inch diameter builders tubes with soil riprap at all tree and shrub locations in accordance to Section "Buried Soil Riprap" to maintain an 18-inch-deep hole for planting in buried soil riprap.
- D. Seed planting area and cover with clean straw mulch and coir fiber matting.
- E. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Owner's Representative's acceptance of layout before planting. Make minor adjustments as required.
- F. Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.

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3.3 INSTALLATION

- A. All areas disturbed by construction shall be planted in accordance with the composition and planting schedules for each designated planting zone. Areas within designated planting zones not disturbed by construction shall be supplemented with trees and shrubs to meet the acre quantities specified in the composition schedule.
- B. The Contractor shall refer to the planting plan and plant schedule on the plans for specific spacing requirements.
- C. In the plant schedule, the Contractor shall use the overall spacing figure to determine the spacing between each species of vegetation. The Contractor shall use the individual spacing figure to determine the spacing between each plant of the same species.
- D. Immediately after site preparation, seeding, straw mulching, matting, and approval, trees and shrubs shall be planted.
- E. Root stock of the plant material shall be kept moist during transport, from the source, to the job site and until planted.
- F. The Contractor may be required to flag and label individual planting pits at specific locations. Upon planting a typical area within each planting zone, the Contractor shall have the Owner's Representative inspect and approve plant spacing and planting techniques before proceeding.
- G. Coir fiber matting shall be cut to accommodate plantings.
- H. All planting pits shall be dug by hand or, in the case of joint planting, shall occur in the holes maintained by the cylindrical builders tube. Prior to planting, remove the builders tube. Walls of planting pits shall be dug so that they are vertical, or sloping outward in heavy soils. Scarify the walls of the pit after digging.
- I. Planting pit shall be 1.5 times the width of the root mass.
- J. The planting pit shall be deep enough to allow the first lateral root of the root mass to be flush with the final grade.
- K. Remove all non-organic debris from the pit and tamp loose soil in the bottom of the pit by hand.
- L. Remove the plant from the container either by cutting or inverting the container.
- M. Do not handle the plant by the branches, leaves, trunk or stem.
- N. Place the plant straight in the center of the planting pit, carrying the plant by the root mass. Never lift or carry a plant by the trunk or branches.
- O. Place 4 ounces of fertilizer in each plant pit for up to 1 gallon size containers, 6 ounces for up to 3 gallon container size, and place 8 ounces for up to a 5 gallon container size. Place the fertilizer in the planting pit completely surrounding the plant ball prior to backfilling.

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- P. Mix a minimum of 500 spores of endomycorrhizal fungi and 30 million spores of ectomycorrhizal fungi to each cubic foot of backfill for trees and shrub planting.
- Q. Backfill planting pit with existing soil and hand tamp as pit is being backfilled to completely fill all voids and air pockets. Do not over compact soil. Make sure plant remains straight during backfilling/tamping procedure.
- R. Do not cover the top of the root mass with soil.
- S. An 18 inch diameter area of mulch shall be placed around each plant. Mulch shall be 2-3 inches thick. Mulch shall NOT be placed directly against the stem of the plant.
- T. Water plant thoroughly immediately after planting, unless otherwise directed by the Owner's Representative.
- U. The Contractor shall leave no open planting pits at the close of each day.

3.4 TREE AND SHRUB PRUNING

- A. Remove only dead, dying, or broken branches. Do not prune for shape.

3.5 PLANT MAINTENANCE

- A. Tree and Shrub Maintenance: Maintain plantings by pruning, cultivating, watering, weeding, adjusting and repairing, and resetting to proper grades or vertical position, as required to establish healthy, viable plantings.

3.6 CLEANUP AND PROTECTION

- A. During planting, keep adjacent paving and construction clean and work area in an orderly condition.
- B. Protect exterior plants from damage due to landscape operations, operations by other contractors and trades, and others. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.
- C. During installation of trees and shrubs, all areas shall be kept neat, clean and free of all trash and debris, and all reasonable precautions shall be taken to avoid damage to existing plants, turf, structures, and private property.

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3.7 DISPOSAL

- A. Disposal: Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 329300

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SECTION 329400 – LIVE BRANCH LAYERING WITH SOIL LIFTS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes harvesting, transporting, installing and maintaining live branch layering materials, the excavation and disposal of debris-laden material, and the installation of soil lifts using coir fiber matting to the grades specified in the Contract Documents, or as directed by the Owner's Representative.
- B. Related Sections:
 - 1. Division 32 Section "Coir Fiber Matting" for description and installation of coir fiber matting.
 - 2. Division 32 Section "Herbaceous Seeding" for description and installation of native seed.
 - 3. Division 32 Section "Rock Toe Protection".

1.3 SUBMITTALS

- A. Harvesting Sites: The Contractor shall notify the Owner's Representative 72 hours prior to harvesting for review and approval of all harvesting sites.

1.4 WARRANTY

- A. Special Warranty: Installer's standard form in which Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Death and unsatisfactory growth, except for defects resulting from lack of adequate maintenance, neglect, abuse by Owner, or incidents that are beyond Contractor's control.
 - b. Structural failures including erosion of soil lifts.
 - 2. Warranty Periods from Date of Substantial Completion:
 - a. Live Branch Layering: One year.

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3. Include the following remedial actions as a minimum:
 - a. Appropriate remedial actions will be determined by the Owner's Representative based on the condition of the live branch layering and stream banks. Such actions may include installing additional live branches or other material
 - b. Provide extended warranty for replaced plant materials; warranty period equal to original warranty period.

PART 2 – PRODUCTS

2.1 LIVE BRANCH CUTTINGS

- A. Live branch cuttings shall be approximately one ½ inch in diameter.
- B. Cuttings shall be long enough to reach the back of the bench and extend a minimum of 1.0 foot and maximum of 1.5 feet from the rebuilt slope face (approximately 4 to 5 feet total length). Side branches and bark shall remain intact prior to installation.
- C. Live branch cuttings shall consist of the species shown in the planting schedule for Zone A Live Branch Layering in the contract documents.

2.2 SOIL LIFTS

- A. Soil material for the soil lifts shall consist of soil excavated from within the construction limits that meets the specifications for topsoil as described in the Contract Documents. Fill material shall be compacted to 0.75 Proctor density.

PART 3 – EXECUTION

3.1 GENERAL

- A. All materials and construction techniques shall be inspected and approved by the Owner's Representative prior to installation.

3.2 HARVESTING

- A. The source of all live cuttings shall be located on-site or within 25 miles of the project site. The Contractor shall locate, flag, and code the live cutting sites. Upon approval by the Owner's Representative, the Contractor shall be responsible for harvesting and transporting the cuttings to the job site.

3.3 LIVE MATERIAL PREPARATION

- A. All cuts shall be smooth and the cut surface kept small. The use of large pruning shears or power saws may be required.

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- B. The live materials should be transported to the construction site within 8 hours of harvesting and then cut to size, as specified above and on the details.
- C. Live materials not installed within 8 hours of harvesting, shall be protected against drying out and overheating. Protection against drying out shall be accomplished by keeping the material: covered, transported in unheated vehicles, moistened and/or kept in soak pits. Storage of live materials shall include continuous shade by covering with evergreen branches or plastic sheeting. Proper storage shall also include sheltering live plant material from the wind and protection from drying by being heeled into moist soils and/or sprayed with anti-transpirant chemicals. Where water is available, live branch cuttings shall be sprayed or immersed.
- D. Warm water stimulates growth and should be used only upon the approval of the Owner's Representative. Any costs associated with such storage are incidental to the overall unit costs.
- E. Live materials shall be installed the same day that the cuttings are harvested. If installation of live materials cannot be accomplished on the same day and storage is required, live materials shall be stored for a period no longer than 2 days. Any storage of live materials must be approved by the Owner's Representative prior to storing.

3.4 LIVE BRANCH LAYERING INSTALLATION

- A. Stream banks with live branch layering shall have a slope flatter than 1:1. Grade back steeper banks to a slope less than 1:1.
- B. The bottom branch layer shall begin at the top face of the bottom row of variegated limestone block, which corresponds to 1.0 to 1.5 feet above the top of the rock toe protection. Branch layer locations shall correspond with the top face of each row of variegated limestone block not including the top row. The branch layers shall have a maximum vertical spacing of 3 feet, which equals the height of each row of variegated limestone block.
- C. Benches shall be constructed a maximum of 3.5 feet deep into the bank.
- D. Benches shall be excavated with a 15 degree angle from horizontal sloping downward from front to back. The surface of the bench shall be sloped so that the outside edge is higher than the back edge.
- E. Coir fiber matting shall be placed from behind the rock toe protection up to the first layer of live branch layering and continuing into the back of the first bench. The coir fiber matting behind the rock toe shall be keyed into the slope a minimum of 1 foot and shall be installed in accordance with Section "Coir Fiber Matting".
- F. Apply herbaceous seed and clean straw mulch prior to installing coir fiber matting according to Section "Herbaceous Seeding".

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- G. Place a 3 inch layer (a minimum of 16 branches per linear foot) of live branch cuttings on the bench, horizontal to the slope face. Place the branches in a crisscross configuration with the growing tips of the live material oriented toward the outside of the bench. Some of the basal ends of the branches shall touch the back of the bench.
- H. Branch tips shall extend a minimum of 1 foot beyond the edge of the bench, but no more than 1.5 feet from rebuilt bank slope.
- I. Once the branches are in place, topsoil shall be backfilled on top of the branches and compacted such that soil completely fills all voids between all the branches. If necessary, the backfill should be saturated with water to ensure maximum soil to branch contact.
- J. After backfilling branches, coir fiber matting shall be placed from the back of the bench to extend to the bank and up to the back of the next bench and backfilled to meet the proposed grade. Place seed and clean straw mulch on the final grade prior to covering with coir fiber matting.
- K. Continue this process until the specified number of live branch layers has been installed. Subsequent layers of live branch layering shall be placed at the elevation of the top face of the next row of variegated limestone block not including the top row, a maximum of 3 feet above the previous layer with coir fiber matting placed on the bank between the two layers and into the back of the trenches. The last layer shall have a minimum of 1 foot of soil on top of the branches and the topmost end of coir fiber matting shall be keyed into the ground a minimum of 1 foot. Seed and place clean straw mulch final grade before installing coir fiber matting.

3.5 CLEAN UP

- A. During installation of live branch layering with soil lifts, all areas shall be kept neat, clean and free of all trash and debris, and all reasonable precautions shall be taken to avoid damage to existing plants, turf, structures, and private property. Clean fill material shall be brought in for the creation of soil lifts.
- B. The Contractor shall be responsible for off-site removal and disposal of all trash, excess backfill and any materials incidental to the project and disposing of them off-site.

3.6 SITE INSPECTION

- A. The Owner's Representative shall make a final inspection with the Contractor to ensure all branch layers and soil lifts have been installed according to the Contract Documents.
- B. The Contractor shall be responsible for correcting all deficiencies within 10 calendar days of the inspection.
- C. A final inspection of the corrected actions shall be performed by the Owner's Representative and the Contractor prior to final completion.

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3.7 MAINTENANCE

- A. Live branch layers shall be maintained and monitored for 1 year after the final inspection and approval of the installation.
- B. The Contractor shall perform the following maintenance activities:
 - 1. Replace all diseased and dead vegetation caused by factors other than stream erosion.
 - 2. Keep vegetation cleared of debris following storm events.
 - 3. Prune all dead wood and vegetation as needed.
- C. It will be the Contractor's responsibility to supply water if there is none available on the site. Any costs associated with supplying water shall be the responsibility of the Contractor and shall be included in the unit cost of the live branch layering installation.

END OF SECTION 329400

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SECTION 329401 – ROCK TOE PROTECTION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. KYTC Standard Specifications for Road and Bridge Construction – Geotextile Fabric, Type 1 – Section 214.

1.2 SUMMARY

- A. Section Includes furnishing, transporting, installing and maintaining rock toe protection within the stream channel, as specified on the Contract Documents or as directed by the Owner's Representative.
- B. Related Sections:
 - 1. Division 32 Section "Live Branch Layering with Soil Lifts".

1.3 SUBMITTALS

- A. Product Certificates: From the quarry, verifying the following:
 - 1. Rock Classification.
 - 2. Weight per Cubic Foot.
 - 3. Weight of Rock Being Supplied.
 - 4. Rock quality meeting all specifications.
- B. Material Approval: Samples shall be submitted to the Owner's Representative for approval prior to its use in the project. Any unsuitable material shall be removed at the Contractor's expense.
- C. Layout Approval: The Contractor shall provide layout coordinates and elevations for the proposed rock toe protection locations to Owner's Representative a minimum of 72 hours prior to installation for approval.

PART 2 – PRODUCTS

2.1 ROCK

- A. Rock shall consist of angular flat rock of appropriate color (e.g., green/gray, brown/gray, dark gray, and/or dark brown in color) obtained from an approved source. Rock shall not be harvested from streams or rivers outside a commercial quarry operation. All rock shall be free

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from laminations, weak cleavages and shall not disintegrate from the action of air, salt water and in handling and placing. Granular sedimentary rock shall generally be unacceptable. Concrete shall not be considered as an alternative for rock. White rock is not acceptable.

- B. The dimensions of the rock shall be a minimum of 4 feet and maximum of 5 feet along the long (a) axis, a minimum of 2.5 feet and maximum of 3.5 feet along the median (b) axis, a minimum of 1.5 foot and a maximum of 2.0 feet along the short (c) axis.
- C. The rock shall have a minimum unit weight of 160 lbs. per cubic foot.
- D. The Contractor shall locate potential sources for rocks. The Contractor and the Owner's Representative will jointly visit the sites to determine whether the rock meets the specified requirements.
- E. Rock may come from the limits of grading of this Contract, provided that it meets the specified requirements and is within the limits of grading.
- F. The Contractor shall not be granted an extension of time or extra compensation due to delay caused by sampling, testing, approval or disapproval of rock protection material under the requirements of these Specifications.

2.2 GEOTEXTILE FABRIC TYPE 1

- A. See KYTC Standard Specifications for Road and Bridge Construction – Geotextile Fabric, Type 1 – Section 214.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Rock toe protection shall be installed on top of existing bedrock. In the event that the bedrock is friable or weathered and can be trenched, bedrock shall be trenched before the placement of rocks.
- B. Place geotextile fabric below the bottom rocks and extend it between the rocks and soil up to the top rocks of the rock toe protection. Key geotextile fabric a minimum of 1 foot into the soil behind the top rock.
- C. The bottom layer of rocks shall be placed on the existing bedrock and shall abut one another.
- D. In the event where installation of the rock toe protection may damage tree roots, excavation shall be minimized. This may include reducing the length of the rock toe protection structure. This decision shall be field determined and authorized by the Owner's Representative.

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- E. Additional layers of rocks shall be placed so that they lean on the lower layer of rocks and fit snugly against each other. Each layer of rocks should be offset into the streambank approximately one foot from the front edge of the layer below. Care should be taken when placing rocks that the seams between rocks do not line up with the seams between the lower layer of rocks.
- F. Rock toe protection shall be constructed so that the exposed face of the rocks is flush with the proposed grade.
- G. The top elevation of the rock toe protection shall be 1.0 to 1.5 feet below the top face of the bottom row of variegated limestone blocks. The rock toe protection shall have sufficient layers of rock to extend from the bedrock surface to the top elevation.

3.2 CLEAN-UP

- A. Upon completion of work, reshape slopes and stream bottom to specified elevations.
- B. Remove unsuitable and surplus rocks and excavated materials to fill areas or approved off-site locations.

END OF SECTION 329401

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SECTION 329402 – BURIED SOIL RIPRAP

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. KYTC Standard Specifications for Road and Bridge Construction – Cyclopean Riprap – Section 703.

1.2 SUMMARY

- A. Section includes furnishing and maintaining buried soil riprap on locations designated in the Contract Documents, or as directed by the Owner’s Representative.
- B. Related Sections:
 - 1. KYTC Standard Specifications Sections 703 installation
 - 2. Division 32 Section “Native Exterior Plants around Bridges” for planting in buried soil riprap.
 - 3. Division 32 Section “Herbaceous Seeding” for seeding on buried soil riprap.
 - 4. Division 32 Section “Coir Fiber Matting” for use of coir matting on buried soil riprap.

PART 2 – PRODUCTS

2.1 RIPRAP

- A. Riprap shall consist of cyclopean stone riprap as described in Section 703 of the KYTC Standard Specifications for Road and Bridge Construction.

2.2 TOPSOIL

- A. Topsoil: ASTM D 5268, pH range of 5.5 to 7, 2 to 6 percent organic material content; free of stones 1 inch or larger in any dimension and other extraneous materials harmful to plant growth.
 - 1. Topsoil Source: Reuse surface soil stockpiled on-site. Verify suitability of stockpiled surface soil to produce topsoil. Clean surface soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.

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- a. Supplement with imported or manufactured topsoil from off-site sources when quantities are insufficient. Obtain topsoil displaced from naturally well-drained construction or mining sites that is similar to on-site topsoil.

2.3 CYLINDRICAL BUILDERS TUBE

- A. Cylindrical builders tube shall be cardboard tubes typically used as concrete forms. The builders tube shall have a diameter of 18 inches and be cut to the appropriate length to create an 18-inch-deep planting hole in the buried soil riprap.

PART 3 – EXECUTION

3.1 FABRICATION

- A. Mix together topsoil and riprap using a ratio of 35% topsoil with 65% riprap.

3.2 INSTALLATION

- A. Use buried soil riprap instead of standard riprap in any and all areas that are part of a planting zone around the bridges. Soil riprap shall have a minimum thickness of 36 inches.
- B. During installation of soil riprap, place cylindrical builders tubes at all tree and shrub locations to create and maintain a hole for planting. The tubes shall be 18 inches in diameter and shall create a hole 18 inches deep.
- C. Install soil riprap according to Section 703 of the KYTC Standard Specifications for Road and Bridge Construction. Bury soil riprap with a minimum depth of 8 inches of topsoil to meet proposed grade.
- D. Place herbaceous seed mix and clean straw mulch in accordance with Section “Herbaceous Seeding”.
- E. Place coir fiber matting in accordance with Section “Coir Fiber Matting”.
- F. Install trees and shrubs in accordance with Section “Native Exterior Plants around Bridges”. Remove builders tubes prior to plant installation and backfill planting hole with topsoil.

3.3 CLEAN UP

- A. The Contractor shall be responsible for off-site removal and disposal of all trash, excess backfill and any materials incidental to the project and disposing of them off-site.

END OF SECTION 329402

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SECTION 329403 – COIR FIBER MATTING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes furnishing, transporting, maintaining and installing coir fiber matting on locations designated in the Contract Documents, or as directed by the Owner's Representative.
- B. Related Sections:
 - 1. Division 32 Section "Live Branch Layering with Soil Lifts" for use of coir matting for soil lifts in live branch layering areas.
 - 2. Division 32 Section "Herbaceous Seeding" for use of coir matting in seeding areas.

1.3 SUBMITTALS

- A. Source: Source of coir fiber matting shall be submitted to the Owner's Representative for review and approval prior to beginning construction.

PART 2 – PRODUCTS

2.1 COIR FIBER MATTING

- A. Matting shall consist of 100% coconut fiber matting such as Rolanka BioD-Mat 90 or approved equivalent. Installation shall be in accordance with the manufacturer's recommendations, or as directed by the Owner's Representative.

2.2 STAKES

- A. Stakes must be wooden stakes constructed out of 18-inch-long pieces of 2-inch by 4-inch lumber cut along the diagonal, unless otherwise directed by the Owner's Representative. Stakes shall be notched at top to more securely hold the matting in place.

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PART 3 – EXECUTION

3.1 INSTALLATION

- A. All materials and construction techniques shall be inspected and approved by the Owner's Representative prior to installation.
- B. Place herbaceous seed mix and clean straw mulch in accordance with Section "Herbaceous Seeding."
- C. The Contractor shall install and secure coir fiber matting in all planting zones at Bridges F401 through F404, F409, and F411 and at the four canoe launches or as directed by the Owner's Representative. The matting shall be secured by 'keying' it into the existing ground a minimum of 1 foot unless otherwise specified in the construction details. The Contractor shall then unroll the coir fiber matting along the slope face until finally anchoring the mat into the top of the slope by 'keying' the mat a minimum of 1 foot into the existing ground. Matting shall be placed loosely and in full contact with the soil.
- D. Matting edges (mats side by side at a given elevation) shall overlap approximately 6 inches, with the upstream mat on top. Stakes shall straddle the edge of the mat on top and the underlying mat.
- E. Mat ends (mats ending upslope from downslope mats) shall overlap approximately 6 inches with the upslope mat over the downslope mat. The overlapping area shall be secured with stakes spaced at a minimum of 2 feet on center.
- F. Stakes shall be arrayed 2 feet on center across each mat, so that there shall be approximately 2 stakes per square yard.

3.2 Clean-up

- A. During installation of coir fiber matting, all areas shall be kept neat, clean and free of all trash and debris, and all reasonable precautions shall be taken to avoid damage to existing plants, turf, structures, and private property.
- B. The Contractor shall be responsible for off-site removal and disposal of all trash, excess backfill and any materials incidental to the project and disposing of them off-site.

END OF SECTION 329403

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SECTION 329404 – LIVE STAKING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes: harvesting, transporting, installing and maintaining live branch layering materials, the excavation and disposal of debris-laden material, and the installation of soil lifts using coir fiber matting to the grades specified in the Contract Documents, or as directed by the Owner's Representative.
- B. Related Sections:
 - 1. Division 32 Section "Coir Fiber Matting" for description and installation of coir fiber matting.
 - 2. Division 32 Section "Herbaceous Seeding" for description and installation of native seed.

1.3 SUBMITTALS

- A. Harvesting Sites: The Contractor shall notify the Owner's Representative 72 hours prior to harvesting for review and approval of all harvesting sites.

1.4 WARRANTY

- A. Special Warranty: Installer's standard form in which Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Death and unsatisfactory growth, except for defects resulting from lack of adequate maintenance, neglect, abuse by Owner, or incidents that are beyond Contractor's control.
 - b. Structural failures including erosion of soil lifts.
 - 2. Warranty Periods from Date of Substantial Completion:
 - a. Live Staking: One year.

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3. Include the following remedial actions as a minimum:
 - a. Appropriate remedial actions will be determined by the Owner's Representative based on the condition of the live staking and stream banks. Such actions may include installing additional live stakes or other material
 - b. Provide extended warranty for replaced plant materials; extended warranty period equal to original warranty period.

PART 2 – PRODUCTS

2.1 LIVE STAKE CUTTINGS

- A. Live stake cuttings shall be approximately a ½ inch to one and ½ inch in diameter.
- B. Cuttings shall be live, healthy, straight, and free of disease and shall be two to three feet long.
- C. Live branch cuttings shall consist of the species shown in the planting schedule for Zone D Live Staking in the contract documents.

PART 3 – EXECUTION

3.1 GENERAL

- A. All materials and construction techniques shall be inspected and approved by the Owner's Representative prior to installation.

3.2 HARVESTING

- A. The source of all live stake cuttings shall be located on-site or within 25 miles of the project site. The Contractor shall locate, flag, and code the live cutting sites. Upon approval by the Owner's Representative, the Contractor shall be responsible for harvesting and transporting the cuttings to the job site. Harvesting must occur during the dormant period.

3.3 LIVE MATERIAL PREPARATION

- A. All cuts shall be smooth and the cut surface kept small. Top cuts shall be square cut with the basal end cut at a point or angle to assist with installation. The use of large pruning shears or power saws may be required.
- B. The live materials should be transported to the construction site within 8 hours of harvesting and then cut to size, as specified above and on the details.

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- C. Live materials not installed within 8 hours of harvesting, shall be protected against drying out and overheating. Protection against drying out shall be accomplished by keeping the material: covered, transported in unheated vehicles, moistened and/or kept in soak pits. Storage of live materials shall include continuous shade by covering with evergreen branches or plastic sheeting. Proper storage shall also include sheltering live plant material from the wind and protection from drying by being heeled into moist soils and/or sprayed with anti-transparent chemicals. Where water is available, live stake cuttings shall be sprayed or immersed.
- D. Warm water stimulates growth and should be used only upon the approval of the Owner's Representative. Any costs associated with such storage are incidental to the overall unit costs.
- E. Live materials shall be installed the same day that the cuttings are harvested. If installation of live materials cannot be accomplished on the same day and storage is required, live materials shall be stored for a period no longer than 2 days. Any storage of live materials must be approved by the Owner's Representative prior to storing.

3.4 LIVE STAKE INSTALLATION

- A. Prior to live staking activities, the exposed soil surfaces shall be seeded with the specified native seed mix and covered with clean straw mulch and coir fiber matting.
- B. Stream banks with live staking shall have a slope flatter than 2:1. Grade back steeper banks to a slope less than 2:1.
- C. The bottom row of live stakes shall be installed within one foot of the toe of banks slope. Live stakes shall be installed on two-foot centers with each subsequent row of stakes staggered from the layer below.
- D. Stakes shall be installed through the coir matting and shall be installed up to 75% to 80% of its length into the ground surface. Be careful not to damage stakes or split end during installation. (make a pilot hole in firm soils prior to installing stakes.) If ends are damaged during installation and damaged end is less than ½ inch, top ends can be cut flat.
- E. Tamp the soil around the stakes after installation.

3.5 CLEAN-UP

- A. During installation of live stakes, all areas shall be kept neat, clean and free of all trash and debris, and all reasonable precautions shall be taken to avoid damage to existing plants, turf, structures, and private property.
- B. The Contractor shall be responsible for off-site removal and disposal of all trash, excess backfill and any materials incidental to the project and disposing of them off-site.

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3.6 SITE INSPECTION

- A. The Owner's Representative shall make a final inspection with the Contractor to ensure all live stakes have been installed according to the Contract Documents.
- B. The Contractor shall be responsible for correcting all deficiencies within 10 calendar days of the inspection.
- C. A final inspection of the corrected actions shall be performed by the Owner's Representative and the Contractor prior to final completion.

3.7 MAINTENANCE

- A. Live stakes shall be maintained and monitored for 1 year after the final inspection and approval of the installation.
- B. The Contractor shall perform the following maintenance activities:
 - 1. Replace all diseased and dead vegetation caused by factors other than stream erosion.
 - 2. Keep vegetation cleared of debris following storm events.
 - 3. Prune all dead wood and vegetation as needed.
- C. It will be the Contractor's responsibility to supply water if there is none available on the site. Any costs associated with supplying water shall be the responsibility of the Contractor and shall be included in the unit cost of the live branch layering installation.

END OF SECTION 329404

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SECTION 331100 – SITE WATER SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Louisville Water Company Standard Specifications for Installing Water Mains, Fire Hydrants, and Services.
- C. Kentucky State Plumbing Law, Regulations & Code

1.2 DESCRIPTION OF WORK

- A. Site domestic and fire water services outside the building as indicated on drawings and schedules, and by requirements of this Section.

1.3 RELATED SECTIONS

- A. Section 033000 "Cast-in -Place Concrete".
- B. Section 312000 "Earth Moving" for exaction and backfill required for water systems.

1.4 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of water systems materials and products, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Installer's Qualifications: Firm with at least 3 years of successful installation experience on projects with water systems work similar to that required for project.
- C. Codes and Standards:
 - 1. Plumbing Code Compliance: Comply with applicable portions of Kentucky State Standard Plumbing Code pertaining to selection and installation of water systems materials and products.
 - 2. Comply with requirements of utility supplying water to project.
 - 3. Obtain required permits and inspections.
 - 4. Comply with standards of authorities having jurisdiction for fire protection systems.
 - 5. Comply with NFPA 24 "Standard for the Installation of Private Fire Service Mains and Their Appurtenances" for materials, installation, tests, and flushing.

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1.5 SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data and installation instructions for piping, valves, water meter, backflow preventers, fire hydrants, fire department connections, yard hydrants, and identification material devices.
 - 1. Provide listing/approval stamp, label, or other marking on equipment made to specified standards.
- B. Record Drawings: At project closeout, submit record drawings of installed water system piping and products, in accordance with requirements of Division 1

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Preparation for Transport: Prepare valves, including fire hydrants, for shipping as follows:
 - 1. Ensure valves are dry and internally protected against rust and corrosion.
 - 2. Protect valves against damage to threaded ends, flange faces, and weld ends.
 - 3. Set valves in best position for handling. Set gate valves closed to prevent rattling.
- B. Storage: Use the following precautions for valves during storage.
 - 1. Do not remove end protectors unless necessary for inspection, then reinstall for storage.
 - 2. Protect valves from weather. Store valves indoors. Maintain valve temperature higher than the ambient dew point temperature. If outdoor storage is necessary, support valves off the ground or pavement in watertight enclosures.
- C. Handling: Use a sling to handle valves whose size requires handling by crane or lift. Rig valves to avoid damage to exposed valve parts. Do not use hand wheels or stems as lifting or rigging points.
- D. Deliver pipes and tubes with factory-applied end-caps. Maintain end-caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.
- E. Protect stored pipes and tubes from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.
- F. Protect flanges, fittings, and piping specialties from moisture and dirt.

1.7 PROJECT CONDITIONS

- A. Perform site survey, research public utility records, and verify existing utility locations.
- B. Verify that water system piping may be installed in compliance with original design and referenced standards.

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PART 2 - PRODUCTS

2.1 PRESSURE PIPE

- A. General: Water service mains can be ductile iron pipe or PVC. Building services must be copper or per the State Plumbing Code. Provide ells, tees, reducing tees, wyes, couplings and other required piping accessories of same type and class of material as conduit, or of material having equal or superior physical and chemical properties as acceptable to Owner.
- B. Ductile-Iron Pipe 41inches and Larger: AWWA C151, Class 50, except that pipe smaller than 6-inch size shall be Class 51.
 - 1. Lining: AWWA C104, cement mortar, seal coated.
 - 2. Gaskets: AWWA C111.
 - 3. Ductile-Iron and Cast-Iron Fittings: AWWA C110, ductile-iron or cast-iron, 250-psi pressure rating; or AWWA C153, ductile-iron compact fittings, 350-psi pressure rating.
 - a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
 - b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
 - 4. Encasement: AWWA C105, polyethylene film tube.
- C. PVC Schedule 40 Pipe: ASTM D 1785
 - 1. PVC, Schedule 40 Socket Fittings: ASTM D 2466.
- D. PVC, AWWA Pipe: AWWA C900, Class 200, with bell end with gasket and spigot end.
 - 1. PVC Fabricated Fittings: AWWA C900, class 200 with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.
 - 2. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
 - a. Gaskets: AWWA C111, rubber.
- E. Copper Tube and Fittings
 - 1. Soft Copper Tube: ASTM 88, Type K (ASTM B 88M, Type A) water tube, annealed temper.
 - a. Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, Wrought-copper, solder-joint pressure type. Furnish only wrought-copper fittings if indicated.
 - 2. Hard Copper Tube: ASTM 88, Type K (ASTM B 88M, Type A) water tube, drawn temper.
 - 3. Copper Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, Wrought-copper, solder-joint pressure type. Furnish only wrought-copper fittings if indicated.

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2.2 VALVES

- A. General: Provide valves and flow control devices as indicated.
- B. Minimum working pressure, 150 psi unless otherwise indicated.
- C. Rising Stem Gate Valves, 3 Inches and Larger: AWWA C500, cast-iron double disc, bronze disc and seat rings, or AWWA C509, resilient seated; cast-iron or ductile-iron body and bonnet, OS&Y, bronze stem, flanged ends.
- D. Nonrising Stem Gate Valves, 2 Inches and Smaller: MSS SP-80; body and screw bonnet of ASTM B 62 cast bronze: with Class 125 threaded ends, solid wedge, non rising copper silicon alloy stem, brass packing gland, Teflon impregnated packing, and malleable iron handwheel (if valve box is not required).

2.3 ACCESSORIES

- A. Anchorages: Provide anchorages for tees, wyes, crosses, plugs, caps, bends, valves, and hydrants. After installation, apply full coat of asphalt or other acceptable corrosion-retarding material to surfaces of ferrous anchorages. Thrust Blocks in be installed on all water lines due to the high pressures that may occur in the lines.
 - 1. Clamps, Straps, and Washers: Steel, ASTM A 506.
 - 2. Rods: Steel, ASTM A 575.
 - 3. Rod Couplings: Malleable-iron, ASTM A 197.
 - 4. Bolts: Steel, ASTM A 307.
 - 5. Cast-Iron Washers: Gray-iron, ASTM A 126.
 - 6. Thrust Blocks: Concrete, 2,500 psi.

2.4 IDENTIFICATION

- A. Plastic Underground Warning Tapes: Polyethylene plastic tape, 6 inches wide by 4 mils thick, solid blue in color with continuously printed caption in black letters "CAUTION -WATER LINE BURIED BELOW."

2.5 FIRE HYDRANTS

- A. General: Cast-iron body, compression-type valve, opening against pressure and closing with pressure, 6-inch (150 mm) mechanical joint inlet, 150-psig (1035 kPa) working pressure.
- B. Outlet Threads: NFPA 1963, with external hose thread used by local fire department. Include cast-iron caps with steel chains.
- C. Operating and Cap Nuts: Pentagon 1-1/2 inch (40 mm) point to flat.
- D. Direction of Opening: Open hydrant valve by turning operating nut to the left, or counterclockwise.

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- E. Finish: Red exterior alkyd gloss enamel paint.
 - 1. Dry-Barrel Fire Hydrants: UL 246, FM-approved, two 2-1/2-inch (65 mm) and one 4-1/2-inch (113 mm) outlets, 5-1/4-inch (133 mm) main valve, drain valve, and 6-inch (150 mm) mechanical joint inlet.

2.6 VALVE BOXES

- A. Cast-iron box having top section and cover with lettering "WATER," bottom section with base of size to fit over valve and barrel approximately 5 inches (124 mm) in diameter, and adjustable cast-iron extension of length required for depth of bury of valve.
 - 1. Provide a steel tee-handle operating wrench with each valve box. Wrench shall have tee handle with one pointed end, stem of length to operate valve, and socket-fitting valve-operating nut.
 - 2. Valve Boxes in grass locations shall have a 12" by 12" by 6" thick concrete collar installed at the ground surface. The top of these valve boxes shall be installed flush with the ground.

PART 3 - EXECUTION

3.1 PREPARATION OF BURIED PIPE FOUNDATION

- A. Grade trench bottom to provide a smooth, firm, stable, and rock-free foundation throughout the length of the piping.
- B. Remove unstable, soft, and unsuitable materials at the surface upon which pipes are to be laid and backfill with clean sand or pea gravel to indicated level.
- C. Shape bottom of trench to fit bottom of piping. Fill unevenness with tamped sand backfill. Dig bell holes at each pipe joint to relieve the bells of all loads and to ensure continuous bearing of the pipe barrel on the foundation.

3.2 INSTALLATION OF PIPE AND PIPE FITTINGS

- A. Ductile-Iron Pipe: Install with cement-mortar-lined, ductile-iron or cast-iron, mechanical joint or push-on joint fittings and rubber gaskets in accordance with AWWA C600:
 - 1. Polyethylene Encasement: Install in accordance with AWWA C105.
- B. Install PVC, AWWA pipe according to AWWA M23 and ASTM F 646:
 - 1. PVC Piping Gasketed Joints: Use jointing materials according to AWWA C900. Construct joints with elastomeric seals and lubricant according to ASTM D 2774 or ASTM D 3139 and pipe manufacturer's written instructions.
 - 2. Depth of Cover: Provide minimum cover over piping of 42 inches below finished grade.

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3.3 INSTALLATION OF VALVES

- A. General: Install valves as indicated with stems pointing up. Provide valve box over underground valves.

3.4 INSTALLATION OF ANCHORAGES

- A. Anchorages: Provide anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches.

3.5 APPLICATION OF PROTECTIVE COATINGS

- A. Apply full coat of asphalt or other acceptable corrosion-retarding material to surfaces of installed ferrous anchorage devices.

3.6 INSTALLATION OF IDENTIFICATION

- A. Install continuous plastic underground warning tape during back filling of trench for underground water service piping. Locate 6 to 8 inches below finished grade, directly over piping.

3.7 FIELD QUALITY CONTROL

- A. Piping Tests: Conduct piping tests before joints are covered and after thrust blocks have sufficiently hardened. Fill pipeline 24 hours prior to testing and apply test pressure to stabilize system. Use only potable water.
- B. Hydrostatic Tests: Test at not less than 1-1/2 times working pressure for 2 hours.
- C. Increase pressure in 50-psig (350 kPa) increments and inspect each joint between increments. Hold at test pressure for 1 hour; decrease to 0 psig (0 kPa). Slowly increase again to test pressure and hold for 1 more hour. Maximum allowable leakage is 2 quarts (1.89 L) per hour per 100 joints. Remake leaking joints with new materials and repeat test until leakage is within above limits

3.8 CLEANING

- A. Clean and disinfect water distribution piping as follows.
 - 1. Purge all new water distribution piping systems and parts of existing systems that have been altered, extended, or repaired, prior to use.
 - 2. Use the purging and disinfecting procedure prescribed by the authority having jurisdiction or, if method is not prescribed by that authority, use procedure described in AWWA C651 or as described below:
 - a. Comply with NFPA 24 for flushing of piping. Flush piping system with clean, potable water until dirty water does not appear at points of outlet.

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- b. Fill system or part of system with water/chlorine solution containing at least 50 parts per million of chlorine; isolate and allow to stand for 3 hours.
- c. Drain system or part of system of previous solution and refill with water/chlorine solution containing at least 200 parts per million of chlorine; isolate and allow to stand for 3 hours.
- d. Following allowed standing time, flush system with clean, potable water until chlorine does not remain in water coming from system.
- e. Submit water samples in sterile bottles to authority having jurisdiction. Repeat procedure if biological examination made by authority shows evidence of contamination.

- B. Prepare reports for purging and disinfecting activities.

END OF SECTION 331100

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SECTION 334100 - STORM DRAINAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Louisville & Jefferson County Metropolitan Sewer District's (MSD) Standard Specifications, latest edition.
- C. Louisville & Jefferson County Metropolitan Sewer District's (MSD) Standard Drawings, latest edition.
- D. Kentucky Department of Highways (KDOH) Standard Drawings, latest edition.

1.2 SUMMARY

- A. Section includes storm drainage outside of buildings.
- B. Related Sections include the following:
 - 1. Section 033000 "Cast-in-Place Concrete" for concrete structures.
 - 2. Section 031200 "Earth Moving" for soil materials, trench excavation and backfill, and site grading.

1.3 DEFINITIONS

- A. PVC: Polyvinyl Chloride Plastic.
- B. HDPE: High Density Polyethylene Pipe.
- C. RCP: Reinforced Concrete Pipe.
- D. RCEP: Reinforced Concrete Elliptical Pipe

1.4 PERFORMANCE REQUIREMENTS

- A. Gravity-Flow, Nonpressure-Piping Pressure Ratings: At least equal to system test pressure.

1.5 SUBMITTALS

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

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B. Shop Drawings:

1. Manholes: Include plans, elevations, sections, details, frames, and covers.
2. Catch basins stormwater inlets and other structures Include plans, elevations, sections, details, frames, covers, and grates.
3. Stormwater Detention Structures: Include plans, elevations, sections, details, frames, covers, design calculations, and concrete design-mix reports.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not store plastic manholes, pipe, and fittings in direct sunlight.
- B. Protect pipe, pipe fittings, and seals from dirt and damage.
- C. Handle manholes according to manufacturer's written rigging instructions.
- D. Handle catch basins and stormwater inlets according to manufacturer's written rigging instructions.

1.7 PROJECT CONDITIONS

- A. Site Information: Perform site survey, research public utility records, and verify existing utility locations and elevations.
- B. Locate existing structures and piping to be closed and abandoned.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

- A. Refer to Part 3 "Piping Applications" Article for applications of pipe and fitting materials Gaskets: ASTM C 564, rubber.

2.2 PIPE AND FITTINGS

- A. PVC Sewer Pipe and Fittings: NPS 12 (DN300) and Smaller: ASTM D 3034, SDR 35, for solvent-cemented or gasketed joints
 1. Gaskets: ASTM F 477, elastomeric seals.
- B. Reinforced-Concrete Sewer Pipe and Fittings: ASTM C76 (ASTM C76M), Class III, Wall B, for gasketed joints.
 1. Gaskets: ASTM C 443 (ASTM C 443M), rubber.

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2.3 MANHOLES

- A. Normal-Traffic Precast Concrete Manholes: Per MSD's Standard Drawings of the depth indicated.
 - 1. Diameter: 48 inches (1200 mm) minimum, unless otherwise indicated.
 - 2. Ballast: Increase thickness of precast concrete sections or add concrete to base section, as required to prevent rotation.
 - 3. Top Section: Eccentric-cone type, unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
 - 4. Pipe Connectors: ASTM C 923 (ASTM C 923M), resilient, of size required, for each pipe connecting to base section.

- B. Manhole Frames and Covers: ASTM A 536, Grade 60-40-18, ductile-iron castings designed for heavy-duty service. Include 24-inch (610-mm) ID by 7- to 9-inch (178- to 229-mm) riser with 4- inch (100-mm) minimum width flange, and 26-inch- (660-mm-) diameter cover. Include indented top design with lettering "STORM SEWER" cast into cover.

2.4 CATCH BASINS

- A. Normal-Traffic, Precast Concrete Catch Basins: ASTM C 478 (ASTM C 478M), precast, reinforced concrete, of depth indicated, with provision for rubber gasketed joints or per MSD's Standard Drawings as described on the drawings.
 - 1. Base Section: 6-inch (150-mm) minimum thickness for floor slab and 4-inch (100-mm) minimum thickness for walls and base riser section, and having separate base slab or base section with integral floor.
 - 2. Top Section: Slab top type as indicated.
 - 3. Gaskets: ASTM C 443 (ASTM C 443M), rubber.
 - 4. Steps: Fiberglass, individual steps or ladder. Include width that allows worker to place both feet on one step and is designed to prevent lateral slippage off step. Cast steps or anchor ladder into base, riser, and top section sidewalls at 12- to 16-inch (300- to 400-mm) intervals. Omit steps for catch basins less than 60 inches (1500 mm) deep.
 - 5. Pipe Connectors: ASTM C 923 (ASTM C 923M), resilient, of size required, for each pipe connecting to base section.

- B. Cast-in-Place Concrete, Catch Basins: Construct of reinforced concrete; designed according to ASTM C 890 for structural loading; of depth, shape, dimensions, and appurtenances as indicated in the plans.
 - 1. Bottom, Walls, and Top: Reinforced concrete.
 - 2. Channels and Benches: Concrete.
 - 3. Steps: Fiberglass, individual steps or ladder. Include width that allows worker to place both feet on one step and is designed to prevent lateral slippage off step. Cast steps or

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anchor ladder into sidewalls at 12- to 16-inch (300- to 400-mm) intervals. Omit steps for catch basins less than 60 inches (1500 mm) deep.

- C. Frames and Grates: As indicated in the plans or ASTM A 536, Grade 60-40-18, ductile iron designed for heavy-duty service. Include flat grate with small square or short-slotted drainage openings.
 - 1. Size: 24 by 24 inches (610 by 610 mm) minimum, unless otherwise indicated.
 - 2. Grate Free Area: Approximately 50 percent, unless otherwise indicated.

2.5 CONCRETE

- A. Cast-in-place concrete according to ACI318, ACI 350R, and the following:
 - 1. Cement: ASTM C 150, Type II.
 - 2. Fine Aggregate: ASTM C 33, sand.
 - 3. Coarse Aggregate: ASTM C 33, crushed gravel.
 - 4. Water: Potable
- B. Portland Cement Design Mix: 4000-psi (27.6 MPa) minimum, with 0.45 maximum water-cementitious ratio:
 - 1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
 - 2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed steel.
- C. Ballast and Pipe Supports: Portland cement design mix, 3000-psi (20.7 MPa) minimum, with 0.58 maximum water-cementitious ratio.
 - 1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
 - 2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed steel.

2.6 CLEANOUTS

- A. Gray-Iron Cleanouts: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug. Use units with top-loading classifications according to the following applications:
 - 1. Light Duty: In earth or grass foot-traffic areas.
 - 2. Medium Duty: In paved foot-traffic areas
 - 3. Heavy Duty: In vehicle-traffic service areas.
 - 4. Extra-Heavy Duty: In roads.
 - 5. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.

THE PARKLANDS OF FLOYDS FORK - PROJECT 4A THE STRAND, TURKEY RUN PARK & BROAD RUN PARK

- B. PVC Cleanouts: PVC body with flush mounted brass plug. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Excavation, trenching, and backfilling are specified in Section 312000 "Earth Moving."

3.2 IDENTIFICATION

- A. Materials and their installation are specified in Section 312000 "Earth Moving." Arrange for installing green warning tapes directly over piping and at outside edges of underground structures."
 - 1. Use warning tape or detectable warning tape over ferrous piping.
 - 2. Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.3 PIPING APPLICATIONS

- A. General: Include watertight, silttight, or soiltight joints, unless watertight or silttight joints are indicated.
- B. Refer to Part 2 of this Section for detailed specifications for pipe and fitting products listed below. Use pipe, fittings, and joining methods according to applications indicated.
- C. Gravity-Flow Piping: As indicated or use the following.
 - 1. NPS 4 and NPS 6 (DN100 and DN150): PVC sewer pipe and fittings, solvent-cemented joints, or gaskets and gasketed joints.
 - 2. NPS 8 to NPS 12 (DN200 to DN300): PVC sewer pipe and fittings, solvent-cemented joints, or gaskets and gasketed joints.
 - 3. NPS 12 to NPS 36 (DN200 to DN900): Reinforced-concrete sewer pipe and fittings, gaskets, and gasketed joints.

3.4 PIPE JOINT CONSTRUCTION

- A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to extent practical.
- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install

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gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab or drag in line, and pull past each joint as it is completed.

3.5 PIPE JOINT CONSTRUCTION AND INSTALLATION

- A. General: Join and install pipe and fittings according to installations indicated.
- B. PVC Sewer Pipe and Fittings: As follows:
 - 1. Join pipe and gasketed fittings with gaskets according to ASTM D 2321.
- C. Concrete Pipe and Fittings: Install according to ACPA's "Concrete Pipe Installation Manual." Use the following seals:
 - 1. Round Pipe and Fittings: ASTM C 443 (ASTM C 443M), rubber gaskets.

3.6 PIPE BACKFILL PLACEMENT

- A. Conform to Section 701 of the KDOH Standard Specifications for Road and Bridge Construction for backfilling underground piping.

3.7 MANHOLE INSTALLATION

- A. General: Install manholes, complete with appurtenances and accessories indicated.
- B. Install precast concrete manhole sections with gaskets according to ASTM C 891.
- C. Form continuous concrete channels and benches between inlets and outlet.
- D. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3 inches (76 mm) above finished surface elsewhere unless otherwise indicated.

3.8 CATCH BASIN INSTALLATION

- A. Construct catch basins to sizes and shapes indicated.
- B. Set frames and grates to elevations indicated.

3.9 CONCRETE PLACEMENT

- A. Place cast-in-place concrete according to ACI 318 and ACI 350R.

3.10 DRAINAGE SYSTEM INSTALLATION

- A. Assemble and install components according to manufacturer's written instructions.

THE PARKLANDS OF FLOYDS FORK - PROJECT 4A THE STRAND, TURKEY RUN PARK & BROAD RUN PARK

3.11 CLEANOUT INSTALLATION

- A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts and cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.
- B. Set cleanout frames and covers in earth in cast-in-place concrete block, 18 by 18 by 12 inches (450 by 450 by 300 mm) deep. Set with tops 1 inch (25 mm) above surrounding earth grade.
- C. Set cleanout frames and covers in concrete pavement and roads with tops flush with pavement surface.

3.12 TAP CONNECTIONS

- A. Make connections to existing piping and underground manholes so finished Work complies as nearly as practical with requirements specified for new Work.
 - 1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye fitting, plus 6-inch (150-mm) overlap, with not less than 6 inches (150 mm) of concrete with 28-day compressive strength of 3000 psi (20.7 MPa).
 - 2. Make branch connections from side into existing piping, NPS 4 to NPS 20 (DN 100 to DN 500). Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye with not less than 6 inches (150 mm) of concrete with 28-day compressive strength of 3000 psi (20.7 MPa).
 - 3. Make branch connections from side into existing piping, NPS 21 (DN 525) or larger, or to underground manholes and structures by cutting into existing unit and creating an opening large enough to allow 3 inches (76 mm) of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall unless otherwise indicated. On outside of pipe, manhole, or structure wall, encase entering connection in 6 inches (150 mm) of concrete for minimum length of 12 inches (300 mm) to provide additional support of collar from connection to undisturbed ground.
 - 4. Protect existing piping, manholes, and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

3.13 CLOSING ABANDONED STORM DRAINAGE SYSTEMS

- A. Abandoned Piping: Close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth

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pressures that may result after ends of abandoned piping have been closed. Use either procedure below.

1. Close open ends of piping with at least 8-inch (200-mm-) thick, brick masonry bulkheads.
2. Close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Do not use wood plugs.
3. Safeloading: Fill pipe with flowable concrete or grout when indicated in the plans.
4. Remove piping under buildings, structures, soccer and softball fields, and track.

B. Abandoned Structures: Excavate around structure as required and use one procedure below:

1. Remove structure and close open ends of remaining piping.
2. Remove top of structure down to at least 36 inches (1000 mm) below final grade. Fill to within 12 inches (300 mm) of top with stone, rubble, gravel, or compacted dirt. Fill to top with concrete.
3. Backfill to grade according to Section 312000 "Earth Moving."

3.14 FIELD QUALITY CONTROL

A. Clear interior of piping and structures of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed.

1. In large, accessible piping, brushes and brooms may be used for cleaning.
2. Place plug in end of incomplete piping at end of day and when work stops.
3. Flush piping between manholes and other structures to remove collected debris, if re-quired by authorities having jurisdiction.

B. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches (600 mm) of backfill is in place, and again at completion of Project.

1. Submit separate reports for each system inspection.
2. Defects requiring correction include the following.
 - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
 - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter. Test plastic piping according to ASTM F 1417.
 - c. Crushed, broken, cracked, or otherwise damaged piping.
 - d. Infiltration: Water leakage into piping.
 - e. Exfiltration: Water leakage from or around piping

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3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.

- C. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.

- D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.
 1. Do not enclose, cover, or put into service before inspection and approval.
 2. Test completed piping systems according to authorities having jurisdiction.
 3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours advance notice.

END OF SECTION 334100

THE PARKLANDS OF FLOYDS FORK - PROJECT 4A THE STRAND, TURKEY RUN PARK & BROAD RUN PARK

SECTION 347113 - GUARDRAIL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Section 312000 "Earth Moving" for aggregate subbase and base.
- C. Kentucky Standard Specifications for Road and Bridge Construction, Section 719, Guardrail.
- D. Kentucky Department of Highways (KDOH) Standard Drawings, latest edition.

1.2 SUMMARY

- A. General: Provide the labor, tools, equipment, and materials necessary to furnish and install the guardrails in accordance with the plans and as specified herein.
- B. This section describes guardrails which include weathering steel, corrugated, sheet-steel beams and pressure-treated wooden posts.

1.3 QUALITY ASSURANCE

- A. Codes and Regulatory Agencies: Perform all work in compliance with all federal, state, and local codes and regulatory agencies.
- B. Standards: Materials and work shall be in conformance with KDOH Standard Drawings.

1.4 SUBMITTALS

- A. Submit the following in accordance with Conditions of Contract and Division 1 specification sections:
 - 1. Product Data: Manufacturer's data for all components.
 - 2. Shop Drawings; Shop drawings for guardrails shall depict plan layout and cross sections, which includes locations of wood posts and terminal sections and ends.
 - 3. Operation and Maintenance Instructions: Submit detailed parts list and data for repair compound used to recoat installed guardrails.

**THE PARKLANDS OF FLOYDS FORK - PROJECT 4A
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PART 2 - PRODUCTS

2.1 MATERIALS AND CONSTRUCTION

- A. General. Provide guardrails as a complete unit produced by a single manufacturer, including necessary erection accessories, fittings, and fastenings.
- B. Rail: Rail shall conform to the Section 814 of the Kentucky Standard Specifications for Road and Bridge Construction. All rails shall be Weathering Steel (Corten) "W" Channel.
- C. Terminal Sections and Ends: Provide terminal sections and ends in accordance with KDOH Standard Drawings and as noted on the plans.
- D. Guardrail Posts: Provide dark-stained square timber posts.
- E. Concrete for Anchoring Posts: See Section 719 of the Kentucky Standard Specifications for Road and Bridge Construction.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify location of underground utilities prior to installation of posts.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Do not begin guardrail installation and erection before asphalt paving is completed.
- B. Wood Posts: Install posts by either of the two following methods:
 - 1. Post Driving. Accomplish driving with suitable equipments and methods that will leave the posts in their final position, free of distortion or other damage.
 - 2. Excavation: Excavate holes for wood posts in firm, undisturbed or compacted soil. Excavate holes to widths as recommended by the guardrail manufacturer. Spread soil from excavations uniformly adjacent to guardrail.
- C. Setting Posts: Remove loose and foreign materials from sides and bottoms of holes and moisten soil prior to placing concrete. Place, trowel, cure, and test concrete in accordance with Division 3.

END OF SECTION 347113

SPECIAL NOTE FOR CONTRACT COMPLETION DATE, LIQUIDATED DAMAGES PAY ON “A” + “B” BIDDING CONTRACT

The procedure for evaluation of bids on this project involves an “A” + “B” concept.

The “A” component of the bid involves the dollar amount for all work required to be performed under the contract. The Add-Alternates will be considered for inclusion into the contract in numerical order as funding allows.

The “B” component of the bid involves the total number of calendar days required for completion of the project including the Add-Alternates.

Preparation of Bid Proposal

The bidder shall establish the number of calendar days necessary to complete the work (inclusive of the Add-Alternates) in accordance with the plans and specifications and show this number in the bid proposal. The product of this number of calendar days multiplied by \$3,000 per day shall be added to the total base bid. The product of calendar days times the daily cost **shall not** be considered in determining mobilization and demobilization costs.

The maximum number of calendar days permitted will be 549 calendar days. Bids will not be accepted for any proposal wherein the bidder establishes calendar days necessary to complete the work in excess of 549 calendar days.

Proposal Guaranty

It **will not** be necessary for the Proposal Guaranty to include an amount necessary to cover the product of calendar days times the daily cost.

Consideration of Bids

Each bid submitted shall consist of two parts:

- A. The dollar amount for all work to be performed (including any selected Add-Alternates as described above) under the contract.
- B. The total number of calendar days required for completion of the project.

The lowest bid will be determined as the lowest combination of (A) and (B) according to the following formula:

$$(A) + [(B) \times (\$3,000)]$$

The above formula **shall be used only determination of the lowest bidder and shall not be used to determine the final contract amount to the contractor.**

Completion Date

As stated in the Standard Form of Agreement Between Owner and Contractor, the Commencement Date will be determined and provided by the Owner to the Contractor.

Late Completion of Work

As stated in the Standard Form of Agreement Between Owner and Contractor, failure to achieve Substantial Completion within the Contract Time shall result in liquidated damages imposed upon the Contractor equal to \$3,000 per calendar day. The Date of Substantial Completion will be based on the calendar days "B" established for the selection of lowest bidder.

SPECIAL NOTES FOR UTILITY CLEARANCE

IMPACT ON CONSTRUCTION

PARKLANDS OF FLOYDS FORK, PHASE 4A, JEFFERSON COUNTY PARK ROAD AND LOUISVILLE LOOP TRAIL CONSTRUCTION

GENERAL PROJECT NOTE ON UTILITY PROTECTION

Insert general notes as below for projects where no utility impact expected

Utility coordination efforts have determined that limited utility relocation work is required to complete the project, primarily due to the limited areas where the project improvements overlap public rights of way. All electric and telecommunication facilities are overhead, and there are limited areas of overhead line and/or guying relocations proposed. Similarly there are limited areas of underground water line relocations proposed. The contractor will be responsible for any coordination and adjustments that are discussed or shown in the construction documents; overhead utility relocations will be provided by LGE, and underground water line relocations will be the responsibility of the contractor.

NOTE: DO NOT DISTURB THE FOLLOWING UTILITIES LOCATED WITHIN THE PROJECT DISTURB LIMITS:

The following Utility Companies have facilities in the general project area.

Louisville Gas & Electric (LGE) - Electric (Distribution)

LG&E has overhead facilities along the following corridors which are impacted by the project, including: Old Heady Road, Seatonville Road (KY 1819), Stout Road, Broad Run Road, Fairmount Road and Bardstown Road (US 31E). With the exception of the relocations of facilities within Stout Road and Broad Run Road, as more particularly detailed in a separate section below, these existing facilities are to remain and are **not to be disturbed**.

Louisville Gas & Electric (LGE) - Gas

LG&E has underground gas mains along the following corridors which are impacted by the project, including: Old Heady Road, Seatonville Road (KY 1819), Stout Road, Broad Run Road, Fairmount Road and Bardstown Road (US 31E). These existing facilities are to remain and are **not to be disturbed**.

Louisville Water Company (LWC)

Louisville Water Company (LWC) has existing water mains along the following corridors which are impacted by the project, including: Old Heady Road, Seatonville Road (KY 1819), Stout Road, Broad Run Road, Fairmount Road and Bardstown Road (US 31E). With the exception of the relocations of facilities within Stout Road and Fairmount Road (bridge area), as more particularly detailed in a separate section below, these existing facilities are to remain and are **not to be disturbed**.

AT&T – KY (formerly Bell South)

AT&T has overhead facilities along both sides of the following corridors which are impacted by the project, including: Old Heady Road, Seatonville Road (KY 1819), Stout Road, Broad Run Road, Fairmount Road and Bardstown Road (US 31E). These facilities are to remain and are **not to be disturbed**.

SPECIAL NOTES FOR UTILITY CLEARANCE

IMPACT ON CONSTRUCTION

PARKLANDS OF FLOYDS FORK, PHASE 4A, JEFFERSON COUNTY PARK ROAD AND LOUISVILLE LOOP TRAIL CONSTRUCTION

Insight

Insight Cable has overhead facilities along both sides of the following corridors which are impacted by the project, including: Old Heady Road, Seatonville Road (KY 1819), Stout Road, Broad Run Road, Fairmount Road and Bardstown Road (US 31E). These facilities are to remain and are **not to be disturbed**.

Level 3

Metropolitan Sewer District

Metropolitan Sewer District (MSD) has sanitary sewer facilities within the project area, primarily within the southernmost area of the project where adjacent to and within the Bardstown Road (US 31E) rights of way. These facilities are to remain and are **not to be disturbed**.

The Contractor is fully responsible for protection of all utilities listed above

THE FOLLOWING COMPANIES ARE RELOCATING/ADJUSTING THEIR UTILITIES WITHIN THE PROJECT LIMITS AND WILL BE COMPLETE PRIOR TO CONSTRUCTION

N/A

THE FOLLOWING COMPANIES HAVE FACILITIES TO BE RELOCATED/ADJUSTED BY A 3RD PARTY IN COORDINATION WITH THIS CONTRACT

LGE Relocations

Stout Road

Within the portions of the Stout Road right of way to be relocated/reconstructed, the overhead pole route within this area is to be relocated/reconstructed along the proposed new road/right of way alignment. LGE or their 3rd party contractor shall be responsible for the relocation/reconstruction; contractor shall coordinate work within this area to accommodate LGE's relocation schedule.

Broad Run Road

Within the portions of the Broad Run Road right of way, where adjacent to the Stout Road right of way, guying of the overhead pole route within this area is to be relocated/reconstructed to avoid conflict with the alignment of the Louisville Loop trail within this area. LGE or their 3rd party contractor shall be responsible for the relocation/reconstruction; contractor shall coordinate work within this area to accommodate LGE's relocation schedule.

SPECIAL NOTES FOR UTILITY CLEARANCE

IMPACT ON CONSTRUCTION

PARKLANDS OF FLOYDS FORK, PHASE 4A, JEFFERSON COUNTY PARK ROAD AND LOUISVILLE LOOP TRAIL CONSTRUCTION

THE FOLLOWING COMPANIES HAVE FACILITIES TO BE RELOCATED/ADJUSTED AS INCLUDED IN THIS CONTRACT

LWC/Contractor Relocations

Seatonville Road

Within the portions of the Seatonville Road right of way where Louisville Loop and retaining wall is to be constructed along the north side of the road, east of the Floyds Fork bridge, the underground water line within this area is to be relocated/reconstructed along the Louisville Loop alignment, outside the limits of the proposed retaining wall. This relocation/relocation shall be the responsibility of the contractor. The contractor or sub-contractor shall be LWC-approved to perform water line relocations.

Stout Road

Within the portions of the Stout Road right of way to be relocated/reconstructed, the underground water line within this area is to be relocated/reconstructed along the proposed new road/right of way alignment. This relocation/relocation shall be the responsibility of the contractor. The contractor or sub-contractor shall be LWC-approved to perform water line relocations.

Fairmount Road

Within the portions of the Fairmount Road right of way, where adjacent the bridge expansion over Broad Run Creek, the underground water line within this area is to be relocated/reconstructed to avoid conflicts with the bridge expansion. This relocation/relocation shall be the responsibility of the contractor. The contractor or sub-contractor shall be LWC-approved to perform water line relocations.

COORDINATION WITH UTILITY FACILITY OWNERS

The Contractor will be responsible for contacting all utility facility owners on the subject project to have existing facilities located in the field. The Contractor will coordinate his activities with the utility facility owners to minimize and, where possible, avoid conflicts with utility facilities.

Where conflicts with utility facilities are unavoidable, the Contractor will coordinate any necessary relocation work with the facility owner. The City of Jeffersontown maintains the right to remove or alter portions of this contract if a utility conflict occurs.

SPECIAL NOTES FOR UTILITY CLEARANCE

IMPACT ON CONSTRUCTION

PARKLANDS OF FLOYDS FORK, PHASE 4A, JEFFERSON COUNTY PARK ROAD AND LOUISVILLE LOOP TRAIL CONSTRUCTION

SPECIAL CAUTION NOTE – PROTECTION OF UTILITIES

The City of Jeffersontown makes no guarantees regarding: the existence of utilities, the location of utilities, the utility companies in the project scope, or the potential for conflicts encountered during construction. The location of utilities provided in the contract documents has been furnished by the facility owners and/or by receiving record drawings and may not be accurate. It will be the contractor's responsibility to locate utilities before excavating by calling the various utility owners and by examining any supplemental information supplied by the City of Jeffersontown. If necessary, the contractor shall determine the exact location and elevation of utilities by hand digging to expose utilities before excavating in the area of a utility. The cost of repair and any other associated costs for any damage to utilities caused by the contractor's operations shall be borne by the contractor.

SPECIAL NOTES FOR UTILITY CLEARANCE

IMPACT ON CONSTRUCTION

PARKLANDS OF FLOYDS FORK, PHASE 4A, JEFFERSON COUNTY PARK ROAD AND LOUISVILLE LOOP TRAIL CONSTRUCTION

BEFORE YOU DIG

The contractor is instructed to call 1-800-752-6007 to reach KY 811, the one-call system for information on the location of existing underground utilities. The call is to be placed a minimum of two (2) and no more than ten (10) business days prior to excavation. The contractor should be aware that owners of underground facilities are not required to be members of the KY 811 one-call Before-U-Dig (BUD) service. The contractor must coordinate excavation with the utility owners, including those whom do not subscribe to KY 811. It may be necessary for the contractor to contact the County Court Clerk to determine what utility companies have facilities in the area.

Please Note: The information presented in this Utility Note is informational in nature and the information contained herein is not guaranteed.

SPECIAL NOTES FOR UTILITY CLEARANCE

IMPACT ON CONSTRUCTION

PARKLANDS OF FLOYDS FORK, PHASE 4A, JEFFERSON COUNTY PARK ROAD AND LOUISVILLE LOOP TRAIL CONSTRUCTION

Utility Owners and Contact Person

For

Jefferson County

1. Louisville Gas & Electric (Electric)
820 West Broadway
Louisville, KY 40202
Trouble Line – 1-800-331-7370 (LGE & KU)
(502) 589-3500 (LG&E ONLY)

Greg Geiser
cell: (502) 376-9510
work: (502) 627-3708
Greg.Geiser@lge-ku.com
email 01-27-2011
Coordination mtg. w/ Jim Holderman,
Wayne Curl, 02-02-11
2. Louisville Gas & Electric (Gas)
820 West Broadway
Louisville, KY 40202

Greg Geiser
cell: (502) 376-9510
Greg.Geiser@lge-ku.com
email 01-27-2011
3. Louisville Water Company
550 South Third Street
Louisville, KY 40202

Daniel Tegene, PE
(502) 569-3649
dtegene@lwcky.com
Facility Maps rec'd 9-15-2010
4. AT&T KY
3719 Bardstown Road - 2nd Floor
Louisville, KY 40218

Morgan Herndon
morgan.herndon@att.com
(502) 458-7312
Facility Maps rec'd 9-23-2010
5. Metropolitan Sewer District
700 West Liberty Street
Louisville, KY 40202

Steve Emly
emly@msdlouky.org
(502) 540-6509
Brad Selch
selchb@msdlouky.org
(502) 540-6614
Send to both contacts

SPECIAL NOTES FOR UTILITY CLEARANCE

IMPACT ON CONSTRUCTION

PARKLANDS OF FLOYDS FORK, PHASE 4A, JEFFERSON COUNTY PARK ROAD AND LOUISVILLE LOOP TRAIL CONSTRUCTION

Facility maps on file Email/mtgs/telecon
correspondence on file

6. Insight Communications Company
4701 Commerce Crossings Dr.
Louisville, KY 40229

Deno Barbour
(502) 357-4376
barbour.d@insightcom.com
7. Level 3 Communications
715 S.8th St.
Louisville, KY 40202
502-777-8622

Kevin Webster
Kevin.webster@level3.com
8. Kentucky Data Link (KDL now Windstream)
Project Manager
3701 Communications Way
Evansville, IN 47715

Rick Cunico
ph: (618)-648-2420
cell: (812) 760-6602
fax (812) 456-4731
(812) 759-7844(Maintenance)
WCI.maintenance.south@windstream.com
9. TWTelecom
Medinger Tower
462 S. 4th St., Suite 210
Louisville, KY 40202

Jeremy Cornell
Jeremy.cornell@TWTELECOM.com
(502) 992-1168

PART II
SPECIFICATIONS AND STANDARD DRAWINGS

SPECIFICATIONS REFERENCE

Any reference in the plans or proposal to previous editions of the *Standard Specifications for Road and Bridge Construction* and *Standard Drawings* are superseded by *Standard Specifications for Road and Bridge Construction, Edition of 2012* and *Standard Drawings, Edition of 2012 with the 2012 Revision*.

**Supplemental Specifications to the
Standard Specifications for Road and Bridge Construction, 2012 Edition
Effective with the April 19, 2013 Letting**

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| Subsection: | 109.07.02 Fuel. |
| Revision: | Revise item Crushed Aggregate Used for Embankment Stabilization to the following: Crushed Aggregate Used for Stabilization of Unsuitable Materials Used for Embankment Stabilization |
| Subsection: | 112.03.12 Project Traffic Coordinator (PTC). |
| Revision: | Replace the last paragraph of this subsection with the following: Ensure the designated PTC has sufficient skill and experience to properly perform the task assigned and has successfully completed the qualification courses. |
| Subsection: | 112.04.18 Diversions (By-Pass Detours). |
| Revision: | Insert the following sentence after the 2nd sentence of this subsection. The Department will not measure temporary drainage structures needed for the diversion for payment. These items are incidental to this item of work. |
| Subsection: | 206.04.01 Embankment-in-Place. |
| Revision: | Replace the fourth paragraph with the following: The Department will not measure suitable excavation included in the original plans that is disposed of for payment and will consider it incidental to Embankment-in-Place. |
| Subsection: | 208.02.01 Cement. |
| Revision: | Replace paragraph with the following: Select Type I or Type II cement conforming to Section 801. Use the same type cement throughout the work. |
| Subsection: | 208.03.06 Curing and Protection. |
| Revision: | Replace the fourth paragraph with the following: Do not allow traffic or equipment on the finished surface until the stabilized subgrade has cured for a total of 7-days with an ambient air temperature above 40 degrees Fahrenheit. A curing day consists of a continuous 24-hour period in which the ambient air temperature does not fall below 40 degrees Fahrenheit. Curing days will not be calculated consecutively, but must total seven (7) , 24-hour days with the ambient air temperature remaining at or above 40 degrees Fahrenheit before traffic or equipment will be allowed to traverse the stabilized subgrade. The Department may allow a shortened curing period when the Contractor requests. The Contractor shall give the Department at least 3 day notice of the request for a shortened curing period. The Department will require a minimum of 3 curing days after final compaction. The Contractor shall furnish cores to the treated depth of the roadbed at 500 feet intervals for each lane when a shortened curing time is requested. The Department will test cores using an unconfined compression test. Roadbed cores must achieve a minimum strength requirement of 80 psi. |
| Subsection: | 208.03.06 Curing and Protection. |
| Revision: | Replace paragraph nine with the following: At no expense to the Department, repair any damage to the subgrade caused by freezing. |

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| Subsection: | 213.03.02 Progress Requirements. |
| Revision: | Replace the last sentence of the third paragraph with the following: Additionally, the Department will apply a penalty equal to the liquidated damages when all aspects of the work are not coordinated in an acceptable manner within 7 calendar days after written notification. |
| Subsection: | 402.03.02 Contractor Quality Control and Department Acceptance. |
| Part: | D) Testing Responsibilities. |
| Number: | 4) Density. |
| Revision: | Replace the second sentence of the Option A paragraph with the following: Perform coring by the end of the following work day. |
| Subsection: | 403.02.10 Material Transfer Vehicle (MTV). |
| Revision: | Replace the first sentence with the following: In addition to the equipment specified above, provide a MTV with the following minimum characteristics: |
| Subsection: | 412.02.09 Material Transfer Vehicle (MTV). |
| Revision: | Replace the paragraph with the following: Provide and utilize a MTV with the minimum characteristics outlined in section 403.02.10. |
| Subsection: | 412.03.07 Placement and Compaction. |
| Revision: | Replace the first paragraph with the following: Use a MTV when placing SMA mixture in the driving lanes. The MTV is not required on ramps and/or shoulders unless specified in the contract. When the Engineer determines the use of the MTV is not practical for a portion of the project, the Engineer may waive its requirement for that portion of pavement by a letter documenting the waiver. |
| Subsection: | 412.04 MEASUREMENT. |
| Revision: | Add the following subsection: 412.04.03. Material Transfer Vehicle (MTV). The Department will not measure the MTV for payment and will consider its use incidental to the asphalt mixture. |
| Subsection: | 501.03.19 Surface Tolerances and Testing Surface. |
| Part: | B) Ride Quality. |
| Revision: | Add the following to the end of the first paragraph: The Department will specify if the ride quality requirements are Category A or Category B when ride quality is specified in the Contract. Category B ride quality requirements shall apply when the Department fails to classify which ride quality requirement will apply to the Contract. |
| Subsection: | 605.03.04 Tack Welding. |
| Revision: | Insert the subsection and the following: 605.03.04 Tack Welding. The Department does not allow tack welding. |
| Subsection: | 606.03.17 Special Requirements for Latex Concrete Overlays. |
| Part: | A) Existing Bridges and New Structures. |
| Number: | 1) Prewetting and Grout-Bond Coat. |
| Revision: | Add the following sentence to the last paragraph: Do not apply a grout-bond coat on bridge decks prepared by hydrodemolition. |

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| Subsection: Revision: | 609.03 Construction. Replace Subsection 609.03.01 with the following: 609.03.01 A) Swinging the Spans. Before placing concrete slabs on steel spans or precast concrete release the temporary erection supports under the bridge and swing the span free on its supports. 609.03.01 B) Lift Loops. Cut all lift loops flush with the top of the precast beam once the beam is placed in the final location and prior to placing steel reinforcement. At locations where lift loops are cut, paint the top of the beam with galvanized or epoxy paint. |
| Subsection: Revision: | 611.03.02 Precast Unit Construction. Replace the first sentence of the subsection with the following: Construct units according to ASTM C1577, replacing Table 1 (Design Requirements for Precast Concrete Box Sections Under Earth, Dead and HL-93 Live Load Conditions) with KY Table 1 (Precast Culvert KYHL-93 Design Table) , and Section 605 with the following exceptions and additions: |
| Subsection: Number: Revision: | 613.03.01 Design. 2) Replace "AASHTO Standard Specifications for Highway Bridges" with "AASHTO LRFD Bridge Design Specifications" |
| Subsection: Revision: | 615.06.02 Add the following sentence to the end of the subsection. The ends of units shall be normal to walls and centerline except exposed edges shall be beveled ¾ inch. |
| Subsection: Revision: | 615.06.03 Placement of Reinforcement in Precast 3-Sided Units. Replace the reference of 6.6 in the section to 615.06.06. |
| Subsection: Revision: | 615.06.04 Placement of Reinforcement for Precast Endwalls. Replace the reference of 6.7 in the section to 615.06.07. |
| Subsection: Revision: | 615.06.06 Laps, Welds, and Spacing for Precast 3-Sided Units. Replace the subsection with the following: Tension splices in the circumferential reinforcement shall be made by lapping. Laps may not be tack welded together for assembly purposes. For smooth welded wire fabric, the overlap shall meet the requirements of AASHTO 2012 Bridge Design Guide Section 5.11.2.5.2 and AASHTO 2012 Bridge Design Guide Section 5.11.6.3. For deformed welded wire fabric, the overlap shall meet the requirements of AASHTO 2012 Bridge Design Guide Section 5.11.2.5.1 and AASHTO 2012 Bridge Design Guide Section 5.11.6.2. The overlap of welded wire fabric shall be measured between the outer most longitudinal wires of each fabric sheet. For deformed billet-steel bars, the overlap shall meet the requirements of AASHTO 2012 Bridge Design Guide Section 5.11.2.1. For splices other than tension splices, the overlap shall be a minimum of 12" for welded wire fabric or deformed billet-steel bars. The spacing center to center of the circumferential wires in a wire fabric sheet shall be no less than 2 inches and no more than 4 inches. The spacing center to center of the longitudinal wires shall not be more than 8 inches. The spacing center to center of the longitudinal distribution steel for either line of reinforcing in the top slab shall be not more than 16 inches. |

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| Subsection: | 615.06.07 Laps, Welds, and Spacing for Precast Endwalls. |
| Revision: | Replace the subsection with the following: Splices in the reinforcement shall be made by lapping. Laps may not be tack welded together for assembly purposes. For smooth welded wire fabric, the overlap shall meet the requirements of AASHTO 2012 Bridge Design Guide Section 5.11.2.5.2 and AASHTO 2012 Bridge Design Guide Section 5.11.6.3. For deformed welded wire fabric, the overlap shall meet the requirements of AASHTO 2012 Bridge Design Guide Section 5.11.2.5.1 and AASHTO 2012 Bridge Design Guide Section 5.11.6.2. For deformed billet-steel bars, the overlap shall meet the requirements of AASHTO 2012 Bridge Design Guide Section 5.11.2.1. The spacing center-to-center of the wire fabric sheet shall not be less than 2 inches or more than 8 inches. |
| Subsection: | 615.08.01 Type of Test Specimen. |
| Revision: | Replace the subsection with the following: Start-up slump, air content, unit weight, and temperature tests will be performed each day on the first batch of concrete. Acceptable start-up results are required for production of the first unit. After the first unit has been established, random acceptance testing is performed daily for each 50 yd ³ (or fraction thereof). In addition to the slump, air content, unit weight, and temperature tests, a minimum of one set of cylinders shall be required each time plastic property testing is performed. |
| Subsection: | 615.08.02 Compression Testing. |
| Revision: | Delete the second sentence. |
| Subsection: | 615.08.04 Acceptability of Core Tests. |
| Revision: | Delete the entire subsection. |
| Subsection: | 615.12 Inspection. |
| Revision: | Add the following sentences to the end of the subsection: Units will arrive at jobsite with the "Kentucky Oval" stamped on the unit which is an indication of acceptable inspection at the production facility. Units shall be inspected upon arrival for any evidence of damage resulting from transport to the jobsite. |

PART III

EMPLOYMENT, WAGE AND RECORD REQUIREMENTS

FHWA-1273 -- Revised May 1, 2012

**REQUIRED CONTRACT PROVISIONS
FEDERAL-AID CONSTRUCTION CONTRACTS**

- I. General
- II. Nondiscrimination
- III. Nonsegregated Facilities
- IV. Davis-Bacon and Related Act Provisions
- V. Contract Work Hours and Safety Standards Act Provisions
- VI. Subletting or Assigning the Contract
- VII. Safety: Accident Prevention
- VIII. False Statements Concerning Highway Projects
- IX. Implementation of Clean Air Act and Federal Water Pollution Control Act
- X. Compliance with Governmentwide Suspension and Debarment Requirements
- XI. Certification Regarding Use of Contract Funds for Lobbying

3. A breach of any of the stipulations contained in these Required Contract Provisions may be sufficient grounds for withholding of progress payments, withholding of final payment, termination of the contract, suspension / debarment or any other action determined to be appropriate by the contracting agency and FHWA.

4. Selection of Labor: During the performance of this contract, the contractor shall not use convict labor for any purpose within the limits of a construction project on a Federal-aid highway unless it is labor performed by convicts who are on parole, supervised release, or probation. The term Federal-aid highway does not include roadways functionally classified as local roads or rural minor collectors.

ATTACHMENTS

A. Employment and Materials Preference for Appalachian Development Highway System or Appalachian Local Access Road Contracts (included in Appalachian contracts only)

II. NONDISCRIMINATION

The provisions of this section related to 23 CFR Part 230 are applicable to all Federal-aid construction contracts and to all related construction subcontracts of \$10,000 or more. The provisions of 23 CFR Part 230 are not applicable to material supply, engineering, or architectural service contracts.

I. GENERAL

1. Form FHWA-1273 must be physically incorporated in each construction contract funded under Title 23 (excluding emergency contracts solely intended for debris removal). The contractor (or subcontractor) must insert this form in each subcontract and further require its inclusion in all lower tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services).

In addition, the contractor and all subcontractors must comply with the following policies: Executive Order 11246, 41 CFR 60, 29 CFR 1625-1627, Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The applicable requirements of Form FHWA-1273 are incorporated by reference for work done under any purchase order, rental agreement or agreement for other services. The prime contractor shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

The contractor and all subcontractors must comply with: the requirements of the Equal Opportunity Clause in 41 CFR 60-1.4(b) and, for all construction contracts exceeding \$10,000, the Standard Federal Equal Employment Opportunity Construction Contract Specifications in 41 CFR 60-4.3.

Form FHWA-1273 must be included in all Federal-aid design-build contracts, in all subcontracts and in lower tier subcontracts (excluding subcontracts for design services, purchase orders, rental agreements and other agreements for supplies or services). The design-builder shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Note: The U.S. Department of Labor has exclusive authority to determine compliance with Executive Order 11246 and the policies of the Secretary of Labor including 41 CFR 60, and 29 CFR 1625-1627. The contracting agency and the FHWA have the authority and the responsibility to ensure compliance with Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), and Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

Contracting agencies may reference Form FHWA-1273 in bid proposal or request for proposal documents, however, the Form FHWA-1273 must be physically incorporated (not referenced) in all contracts, subcontracts and lower-tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services related to a construction contract).

The following provision is adopted from 23 CFR 230, Appendix A, with appropriate revisions to conform to the U.S. Department of Labor (US DOL) and FHWA requirements.

2. Subject to the applicability criteria noted in the following sections, these contract provisions shall apply to all work performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract.

1. Equal Employment Opportunity: Equal employment opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (28 CFR 35, 29 CFR 1630, 29 CFR 1625-1627, 41 CFR 60 and 49 CFR 27) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140 shall constitute the EEO and specific affirmative action standards for the contractor's project activities under

this contract. The provisions of the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR 35 and 29 CFR 1630 are incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:

a. The contractor will work with the contracting agency and the Federal Government to ensure that it has made every good faith effort to provide equal opportunity with respect to all of its terms and conditions of employment and in their review of activities under the contract.

b. The contractor will accept as its operating policy the following statement:

"It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, color, national origin, age or disability. Such action shall include: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship, pre-apprenticeship, and/or on-the-job training."

2. EEO Officer: The contractor will designate and make known to the contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active EEO program and who must be assigned adequate authority and responsibility to do so.

3. Dissemination of Policy: All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action, or who are substantially involved in such action, will be made fully cognizant of, and will implement, the contractor's EEO policy and contractual responsibilities to provide EEO in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum:

a. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer.

b. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.

c. All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minorities and women.

d. Notices and posters setting forth the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.

e. The contractor's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.

4. Recruitment: When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minorities and women in the area from which the project work force would normally be derived.

a. The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minorities and women. To meet this requirement, the contractor will identify sources of potential minority group employees, and establish with such identified sources procedures whereby minority and women applicants may be referred to the contractor for employment consideration.

b. In the event the contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, the contractor is expected to observe the provisions of that agreement to the extent that the system meets the contractor's compliance with EEO contract provisions. Where implementation of such an agreement has the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Federal nondiscrimination provisions.

c. The contractor will encourage its present employees to refer minorities and women as applicants for employment. Information and procedures with regard to referring such applicants will be discussed with employees.

5. Personnel Actions: Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, national origin, age or disability. The following procedures shall be followed:

a. The contractor will conduct periodic inspections of project sites to insure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.

b. The contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.

c. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.

d. The contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with its obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of their avenues of appeal.

6. Training and Promotion:

a. The contractor will assist in locating, qualifying, and increasing the skills of minorities and women who are

applicants for employment or current employees. Such efforts should be aimed at developing full journey level status employees in the type of trade or job classification involved.

b. Consistent with the contractor's work force requirements and as permissible under Federal and State regulations, the contractor shall make full use of training programs, i.e., apprenticeship, and on-the-job training programs for the geographical area of contract performance. In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision. The contracting agency may reserve training positions for persons who receive welfare assistance in accordance with 23 U.S.C. 140(a).

c. The contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.

d. The contractor will periodically review the training and promotion potential of employees who are minorities and women and will encourage eligible employees to apply for such training and promotion.

7. Unions: If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use good faith efforts to obtain the cooperation of such unions to increase opportunities for minorities and women. Actions by the contractor, either directly or through a contractor's association acting as agent, will include the procedures set forth below:

a. The contractor will use good faith efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minorities and women for membership in the unions and increasing the skills of minorities and women so that they may qualify for higher paying employment.

b. The contractor will use good faith efforts to incorporate an EEO clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, national origin, age or disability.

c. The contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the contractor, the contractor shall so certify to the contracting agency and shall set forth what efforts have been made to obtain such information.

d. In the event the union is unable to provide the contractor with a reasonable flow of referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, national origin, age or disability; making full efforts to obtain qualified and/or qualifiable minorities and women. The failure of a union to provide sufficient referrals (even though it is obligated to provide exclusive referrals under the terms of a collective bargaining agreement) does not relieve the contractor from the requirements of this paragraph. In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the contracting agency.

8. Reasonable Accommodation for Applicants / Employees with Disabilities: The contractor must be familiar

with the requirements for and comply with the Americans with Disabilities Act and all rules and regulations established there under. Employers must provide reasonable accommodation in all employment activities unless to do so would cause an undue hardship.

9. Selection of Subcontractors, Procurement of Materials and Leasing of Equipment: The contractor shall not discriminate on the grounds of race, color, religion, sex, national origin, age or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment. The contractor shall take all necessary and reasonable steps to ensure nondiscrimination in the administration of this contract.

a. The contractor shall notify all potential subcontractors and suppliers and lessors of their EEO obligations under this contract.

b. The contractor will use good faith efforts to ensure subcontractor compliance with their EEO obligations.

10. Assurance Required by 49 CFR 26.13(b):

a. The requirements of 49 CFR Part 26 and the State DOT's U.S. DOT-approved DBE program are incorporated by reference.

b. The contractor or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the contracting agency deems appropriate.

11. Records and Reports: The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following the date of the final payment to the contractor for all contract work and shall be available at reasonable times and places for inspection by authorized representatives of the contracting agency and the FHWA.

a. The records kept by the contractor shall document the following:

(1) The number and work hours of minority and non-minority group members and women employed in each work classification on the project;

(2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women; and

(3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minorities and women;

b. The contractors and subcontractors will submit an annual report to the contracting agency each July for the duration of the project, indicating the number of minority, women, and non-minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on [Form FHWA-1391](#). The staffing data should represent the project work force on board in all or any part of the last payroll period preceding the end of July. If on-the-job training is being required by special provision, the contractor

will be required to collect and report training data. The employment data should reflect the work force on board during all or any part of the last payroll period preceding the end of July.

III. NONSEGREGATED FACILITIES

This provision is applicable to all Federal-aid construction contracts and to all related construction subcontracts of \$10,000 or more.

The contractor must ensure that facilities provided for employees are provided in such a manner that segregation on the basis of race, color, religion, sex, or national origin cannot result. The contractor may neither require such segregated use by written or oral policies nor tolerate such use by employee custom. The contractor's obligation extends further to ensure that its employees are not assigned to perform their services at any location, under the contractor's control, where the facilities are segregated. The term "facilities" includes waiting rooms, work areas, restaurants and other eating areas, time clocks, restrooms, washrooms, locker rooms, and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing provided for employees. The contractor shall provide separate or single-user restrooms and necessary dressing or sleeping areas to assure privacy between sexes.

IV. DAVIS-BACON AND RELATED ACT PROVISIONS

This section is applicable to all Federal-aid construction projects exceeding \$2,000 and to all related subcontracts and lower-tier subcontracts (regardless of subcontract size). The requirements apply to all projects located within the right-of-way of a roadway that is functionally classified as Federal-aid highway. This excludes roadways functionally classified as local roads or rural minor collectors, which are exempt. Contracting agencies may elect to apply these requirements to other projects.

The following provisions are from the U.S. Department of Labor regulations in 29 CFR 5.5 "Contract provisions and related matters" with minor revisions to conform to the FHWA-1273 format and FHWA program requirements.

1. Minimum wages

a. All laborers and mechanics employed or working upon the site of the work, will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions

of paragraph 1.d. of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph 1.b. of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

b.(1) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

- (i) The work to be performed by the classification requested is not performed by a classification in the wage determination; and
- (ii) The classification is utilized in the area by the construction industry; and
- (iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(2) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(3) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Wage and Hour Administrator for determination. The Wage and Hour Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or

will notify the contracting officer within the 30-day period that additional time is necessary.

(4) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs 1.b.(2) or 1.b.(3) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

c. Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

d. If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program. Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

2. Withholding

The contracting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor under this contract, or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the contracting agency may, after written notice to the contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

3. Payrolls and basic records

a. Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-

Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

b. (1) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the contracting agency. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at <http://www.dol.gov/esa/whd/forms/wh347instr.htm> or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the contracting agency for transmission to the State DOT, the FHWA or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the contracting agency..

(2) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(i) That the payroll for the payroll period contains the information required to be provided under §5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under §5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

(ii) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(iii) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(3) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph 3.b.(2) of this section.

(4) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

c. The contractor or subcontractor shall make the records required under paragraph 3.a. of this section available for inspection, copying, or transcription by authorized representatives of the contracting agency, the State DOT, the FHWA, or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the FHWA may, after written notice to the contractor, the contracting agency or the State DOT, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

4. Apprentices and trainees

a. Apprentices (programs of the USDOL).

Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice.

The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed.

Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly

rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination.

In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

b. Trainees (programs of the USDOL).

Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration.

The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration.

Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed.

In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

c. Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

d. Apprentices and Trainees (programs of the U.S. DOT).

Apprentices and trainees working under apprenticeship and skill training programs which have been certified by the Secretary of Transportation as promoting EEO in connection with Federal-aid highway construction programs are not subject to the requirements of paragraph 4 of this Section IV. The straight time hourly wage rates for apprentices and trainees under such programs will be established by the particular programs. The ratio of apprentices and trainees to journeymen shall not be greater than permitted by the terms of the particular program.

5. Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

6. Subcontracts. The contractor or subcontractor shall insert Form FHWA-1273 in any subcontracts and also require the subcontractors to include Form FHWA-1273 in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

7. Contract termination: debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

9. Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

10. Certification of eligibility.

a. By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

b. No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

c. The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

V. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

The following clauses apply to any Federal-aid construction contract in an amount in excess of \$100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by 29 CFR 5.5(a) or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

1. Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

2. Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (1.) of this section, the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1.) of this section, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1.) of this section.

3. Withholding for unpaid wages and liquidated damages. The FHWA or the contracting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2.) of this section.

4. Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (1.) through (4.) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1.) through (4.) of this section.

VI. SUBLETTING OR ASSIGNING THE CONTRACT

This provision is applicable to all Federal-aid construction contracts on the National Highway System.

1. The contractor shall perform with its own organization contract work amounting to not less than 30 percent (or a greater percentage if specified elsewhere in the contract) of the total original contract price, excluding any specialty items designated by the contracting agency. Specialty items may be performed by subcontract and the amount of any such specialty items performed may be deducted from the total original contract price before computing the amount of work required to be performed by the contractor's own organization (23 CFR 635.116).

a. The term "perform work with its own organization" refers to workers employed or leased by the prime contractor, and equipment owned or rented by the prime contractor, with or without operators. Such term does not include employees or equipment of a subcontractor or lower tier subcontractor, agents of the prime contractor, or any other assignees. The term may include payments for the costs of hiring leased employees from an employee leasing firm meeting all relevant Federal and State regulatory requirements. Leased employees may only be included in this term if the prime contractor meets all of the following conditions:

(1) the prime contractor maintains control over the supervision of the day-to-day activities of the leased employees;

(2) the prime contractor remains responsible for the quality of the work of the leased employees;

(3) the prime contractor retains all power to accept or exclude individual employees from work on the project; and

(4) the prime contractor remains ultimately responsible for the payment of predetermined minimum wages, the submission of payrolls, statements of compliance and all other Federal regulatory requirements.

b. "Specialty Items" shall be construed to be limited to work that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid or propose on the contract as a whole and in general are to be limited to minor components of the overall contract.

2. The contract amount upon which the requirements set forth in paragraph (1) of Section VI is computed includes the cost of material and manufactured products which are to be purchased or produced by the contractor under the contract provisions.

3. The contractor shall furnish (a) a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract requirements, and is in charge of all construction operations (regardless of who performs the work) and (b) such other of its own organizational resources (supervision, management, and engineering services) as the contracting officer determines is necessary to assure the performance of the contract.

4. No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the contracting officer, or authorized representative, and such consent when given shall not be construed to relieve the contractor of any responsibility for the fulfillment of the contract. Written consent will be given only after the contracting agency has assured that each subcontract is

evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract.

5. The 30% self-performance requirement of paragraph (1) is not applicable to design-build contracts; however, contracting agencies may establish their own self-performance requirements.

VII. SAFETY: ACCIDENT PREVENTION

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

1. In the performance of this contract the contractor shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation (23 CFR 635). The contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions as it determines, or as the contracting officer may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract.

2. It is a condition of this contract, and shall be made a condition of each subcontract, which the contractor enters into pursuant to this contract, that the contractor and any subcontractor shall not permit any employee, in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his/her health or safety, as determined under construction safety and health standards (29 CFR 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704).

3. Pursuant to 29 CFR 1926.3, it is a condition of this contract that the Secretary of Labor or authorized representative thereof, shall have right of entry to any site of contract performance to inspect or investigate the matter of compliance with the construction safety and health standards and to carry out the duties of the Secretary under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C.3704).

VIII. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

In order to assure high quality and durable construction in conformity with approved plans and specifications and a high degree of reliability on statements and representations made by engineers, contractors, suppliers, and workers on Federal-aid highway projects, it is essential that all persons concerned with the project perform their functions as carefully, thoroughly, and honestly as possible. Willful falsification, distortion, or misrepresentation with respect to any facts related to the project is a violation of Federal law. To prevent any misunderstanding regarding the seriousness of these and similar acts, Form FHWA-1022 shall be posted on each Federal-aid highway project (23 CFR 635) in one or more places where it is readily available to all persons concerned with the project:

18 U.S.C. 1020 reads as follows:

"Whoever, being an officer, agent, or employee of the United States, or of any State or Territory, or whoever, whether a person, association, firm, or corporation, knowingly makes any false statement, false representation, or false report as to the character, quality, quantity, or cost of the material used or to be used, or the quantity or quality of the work performed or to be performed, or the cost thereof in connection with the submission of plans, maps, specifications, contracts, or costs of construction on any highway or related project submitted for approval to the Secretary of Transportation; or

Whoever knowingly makes any false statement, false representation, false report or false claim with respect to the character, quality, quantity, or cost of any work performed or to be performed, or materials furnished or to be furnished, in connection with the construction of any highway or related project approved by the Secretary of Transportation; or

Whoever knowingly makes any false statement or false representation as to material fact in any statement, certificate, or report submitted pursuant to provisions of the Federal-aid Roads Act approved July 1, 1916, (39 Stat. 355), as amended and supplemented;

Shall be fined under this title or imprisoned not more than 5 years or both."

IX. IMPLEMENTATION OF CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

By submission of this bid/proposal or the execution of this contract, or subcontract, as appropriate, the bidder, proposer, Federal-aid construction contractor, or subcontractor, as appropriate, will be deemed to have stipulated as follows:

1. That any person who is or will be utilized in the performance of this contract is not prohibited from receiving an award due to a violation of Section 508 of the Clean Water Act or Section 306 of the Clean Air Act.

2. That the contractor agrees to include or cause to be included the requirements of paragraph (1) of this Section X in every subcontract, and further agrees to take such action as the contracting agency may direct as a means of enforcing such requirements.

X. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION

This provision is applicable to all Federal-aid construction contracts, design-build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, consultant contracts or any other covered transaction requiring FHWA approval or that is estimated to cost \$25,000 or more – as defined in 2 CFR Parts 180 and 1200.

1. Instructions for Certification – First Tier Participants:

a. By signing and submitting this proposal, the prospective first tier participant is providing the certification set out below.

b. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this

covered transaction. The prospective first tier participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective first tier participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction.

c. The certification in this clause is a material representation of fact upon which reliance was placed when the contracting agency determined to enter into this transaction. If it is later determined that the prospective participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the contracting agency may terminate this transaction for cause of default.

d. The prospective first tier participant shall provide immediate written notice to the contracting agency to whom this proposal is submitted if any time the prospective first tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

e. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. "First Tier Covered Transactions" refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). "Lower Tier Covered Transactions" refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). "First Tier Participant" refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). "Lower Tier Participant" refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

f. The prospective first tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction.

g. The prospective first tier participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transactions," provided by the department or contracting agency, entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the \$25,000 threshold.

h. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (<https://www.epls.gov/>), which is compiled by the General Services Administration.

i. Nothing contained in the foregoing shall be construed to require the establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of the prospective participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

j. Except for transactions authorized under paragraph (f) of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default.

2. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – First Tier Participants:

a. The prospective first tier participant certifies to the best of its knowledge and belief, that it and its principals:

(1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency;

(2) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(3) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (a)(2) of this certification; and

(4) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

b. Where the prospective participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

2. Instructions for Certification - Lower Tier Participants:

(Applicable to all subcontracts, purchase orders and other lower tier transactions requiring prior FHWA approval or estimated to cost \$25,000 or more - 2 CFR Parts 180 and 1200)

a. By signing and submitting this proposal, the prospective lower tier is providing the certification set out below.

b. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department, or agency with which

this transaction originated may pursue available remedies, including suspension and/or debarment.

c. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances.

d. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations. "First Tier Covered Transactions" refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). "Lower Tier Covered Transactions" refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). "First Tier Participant" refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). "Lower Tier Participant" refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

e. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.

f. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the \$25,000 threshold.

g. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (<https://www.epls.gov/>), which is compiled by the General Services Administration.

h. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

i. Except for transactions authorized under paragraph e of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the

department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

* * * * *

Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion--Lower Tier Participants:

1. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency.

2. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

* * * * *

XI. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts which exceed \$100,000 (49 CFR 20).

1. The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

3. The prospective participant also agrees by submitting its bid or proposal that the participant shall require that the language of this certification be included in all lower tier subcontracts, which exceed \$100,000 and that all such recipients shall certify and disclose accordingly.

**ATTACHMENT A - EMPLOYMENT AND MATERIALS
PREFERENCE FOR APPALACHIAN DEVELOPMENT
HIGHWAY SYSTEM OR APPALACHIAN LOCAL ACCESS
ROAD CONTRACTS**

This provision is applicable to all Federal-aid projects funded under the Appalachian Regional Development Act of 1965.

1. During the performance of this contract, the contractor undertaking to do work which is, or reasonably may be, done as on-site work, shall give preference to qualified persons who regularly reside in the labor area as designated by the DOL wherein the contract work is situated, or the subregion, or the Appalachian counties of the State wherein the contract work is situated, except:

a. To the extent that qualified persons regularly residing in the area are not available.

b. For the reasonable needs of the contractor to employ supervisory or specially experienced personnel necessary to assure an efficient execution of the contract work.

c. For the obligation of the contractor to offer employment to present or former employees as the result of a lawful collective bargaining contract, provided that the number of nonresident persons employed under this subparagraph (1c) shall not exceed 20 percent of the total number of employees employed by the contractor on the contract work, except as provided in subparagraph (4) below.

2. The contractor shall place a job order with the State Employment Service indicating (a) the classifications of the laborers, mechanics and other employees required to perform the contract work, (b) the number of employees required in each classification, (c) the date on which the participant estimates such employees will be required, and (d) any other pertinent information required by the State Employment Service to complete the job order form. The job order may be placed with the State Employment Service in writing or by telephone. If during the course of the contract work, the information submitted by the contractor in the original job order is substantially modified, the participant shall promptly notify the State Employment Service.

3. The contractor shall give full consideration to all qualified job applicants referred to him by the State Employment Service. The contractor is not required to grant employment to any job applicants who, in his opinion, are not qualified to perform the classification of work required.

4. If, within one week following the placing of a job order by the contractor with the State Employment Service, the State Employment Service is unable to refer any qualified job applicants to the contractor, or less than the number requested, the State Employment Service will forward a certificate to the contractor indicating the unavailability of applicants. Such certificate shall be made a part of the contractor's permanent project records. Upon receipt of this certificate, the contractor may employ persons who do not normally reside in the labor area to fill positions covered by the certificate, notwithstanding the provisions of subparagraph (1c) above.

5. The provisions of 23 CFR 633.207(e) allow the contracting agency to provide a contractual preference for the use of mineral resource materials native to the Appalachian region.

6. The contractor shall include the provisions of Sections 1 through 4 of this Attachment A in every subcontract for work which is, or reasonably may be, done as on-site work.

**KENTUCKY TRANSPORTATION CABINET
DEPARTMENT OF HIGHWAYS**

**EMPLOYMENT REQUIREMENTS
RELATING TO
NONDISCRIMINATION OF EMPLOYEES
(APPLICABLE TO FEDERAL-AID SYSTEM CONTRACTS)**

**AN ACT OF THE KENTUCKY GENERAL ASSEMBLY
TO PREVENT DISCRIMINATION IN EMPLOYMENT**

**KRS CHAPTER 344
EFFECTIVE JUNE 16, 1972**

The contract on this project, in accordance with KRS Chapter 344, provides that during the performance of this contract, the contractor agrees as follows:

1. The contractor shall not fail or refuse to hire, or shall not discharge any individual, or otherwise discriminate against an individual with respect to his compensation, terms, conditions, or privileges of employment, because of such individual's race, color, religion, national origin, sex, disability or age (between forty and seventy); or limit, segregate, or classify his employees in any way which would deprive or tend to deprive an individual of employment opportunities or otherwise adversely affect his status as an employee, because of such individual's race, color, religion, national origin, sex, disability or age (between forty and seventy). The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

2. The contractor shall not print or publish or cause to be printed or published a notice or advertisement relating to employment by such an employer or membership in or any classification or referral for employment by the employment agency, indicating any preference, limitation, specification, or discrimination, based on race, color, religion, national origin, sex, disability or age (between forty and seventy), except that such notice or advertisement may indicate a preference, limitation, or specification based on religion, or national origin when religion, or national origin is a bona fide occupational qualification for employment.

3. If the contractor is in control of apprenticeship or other training or retraining, including on-the-job training programs, he shall not discriminate against an individual because of his race, color, religion, national origin, sex, disability or age (between forty and seventy), in admission to, or employment in any program established to

provide apprenticeship or other training.

4. The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representative of the contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment. The contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for non-compliance.

REVISED: 12-3-92

EXECUTIVE BRANCH CODE OF ETHICS

In the 1992 regular legislative session, the General Assembly passed and Governor Brereton Jones signed Senate Bill 63 (codified as KRS 11A), the Executive Branch Code of Ethics, which states, in part:

KRS 11A.040 (6) provides:

No present or former public servant shall, within six (6) months of following termination of his office or employment, accept employment, compensation or other economic benefit from any person or business that contracts or does business with the state in matters in which he was directly involved during his tenure. This provision shall not prohibit an individual from returning to the same business, firm, occupation, or profession in which he was involved prior to taking office or beginning his term of employment, provided that, for a period of six (6) months, he personally refrains from working on any matter in which he was directly involved in state government. This subsection shall not prohibit the performance of ministerial functions, including, but not limited to, filing tax returns, filing applications for permits or licenses, or filing incorporation papers.

KRS 11A.040 (8) states:

A former public servant shall not represent a person in a matter before a state agency in which the former public servant was directly involved, for a period of one (1) year after the latter of:

- a) The date of leaving office or termination of employment; or
- b) The date the term of office expires to which the public servant was elected.

This law is intended to promote public confidence in the integrity of state government and to declare as public policy the idea that state employees should view their work as a public trust and not as a way to obtain private benefits.

If you have worked for the executive branch of state government within the past six months, you may be subject to the law's prohibitions. The law's applicability may be different if you hold elected office or are contemplating representation of another before a state agency.

Also, if you are affiliated with a firm which does business with the state and which employs former state executive-branch employees, you should be aware that the law may apply to them.

In case of doubt, the law permits you to request an advisory opinion from the Executive Branch Ethics Commission, Room 136, Capitol Building, 700 Capitol Avenue, Frankfort, Kentucky 40601; telephone (502) 564-7954.

General Decision Number: KY130100 04/26/2013 KY100

Superseded General Decision Number: KY20120125

State: Kentucky

Construction Type: Highway

Counties: Anderson, Bath, Bourbon, Boyd, Boyle, Bracken, Breckinridge, Bullitt, Carroll, Carter, Clark, Elliott, Fayette, Fleming, Franklin, Gallatin, Grant, Grayson, Greenup, Hardin, Harrison, Henry, Jefferson, Jessamine, Larue, Lewis, Madison, Marion, Mason, Meade, Mercer, Montgomery, Nelson, Nicholas, Oldham, Owen, Robertson, Rowan, Scott, Shelby, Spencer, Trimble, Washington and Woodford Counties in Kentucky.

HIGHWAY CONSTRUCTION PROJECTS (excluding tunnels, building structures in rest area projects & railroad construction; bascule, suspension & spandrel arch bridges designed for commercial navigation, bridges involving marine construction; and other major bridges).

| Modification Number | Publication Date |
|---------------------|------------------|
| 0 | 01/04/2013 |
| 1 | 01/11/2013 |
| 2 | 02/22/2013 |
| 3 | 04/26/2013 |

BRIN0004-003 06/01/2011

BRECKENRIDGE COUNTY

| | Rates | Fringes |
|-----------------|----------|---------|
| BRICKLAYER..... | \$ 24.11 | 10.07 |

BRKY0001-005 06/01/2011

BULLITT, CARROLL, GRAYSON, HARDIN, HENRY, JEFFERSON, LARUE, MARION, MEADE, NELSON, OLDHAM, SHELBY, SPENCER, & TRIMBLE COUNTIES:

| | Rates | Fringes |
|-----------------|----------|---------|
| BRICKLAYER..... | \$ 24.11 | 10.07 |

BRKY0002-006 06/01/2011

BRACKEN, GALLATIN, GRANT, MASON & ROBERTSON COUNTIES:

| | Rates | Fringes |
|-----------------|----------|---------|
| BRICKLAYER..... | \$ 26.57 | 10.26 |

BRKY0007-004 06/01/2011

BOYD, CARTER, ELLIOT, FLEMING, GREENUP, LEWIS & ROWAN COUNTIES:

| | Rates | Fringes |
|-----------------|----------|---------|
| BRICKLAYER..... | \$ 28.29 | 16.80 |

BRKY0017-004 06/01/2009

ANDERSON, BATH, BOURBON, BOYLE, CLARK, FAYETTE, FRANKLIN,
HARRISON, JESSAMINE, MADISON, MERCER, MONTGOMERY, NICHOLAS,
OWEN, SCOTT, WASHINGTON & WOODFORD COUNTIES:

| | Rates | Fringes |
|-----------------|----------|---------|
| BRICKLAYER..... | \$ 24.11 | 9.97 |

* CARP0064-001 04/01/2013

| | Rates | Fringes |
|--------------------|----------|---------|
| CARPENTER..... | \$ 26.90 | 14.46 |
| Diver..... | \$ 40.73 | 14.46 |
| PILEDRIVERMAN..... | \$ 27.15 | 14.46 |

ELEC0212-008 12/03/2012

BRACKEN, GALLATIN and GRANT COUNTIES

| | Rates | Fringes |
|------------------|----------|---------|
| ELECTRICIAN..... | \$ 26.35 | 15.44 |

ELEC0212-014 06/27/2011

BRACKEN, GALLATIN & GRANT COUNTIES:

| | Rates | Fringes |
|--|----------|---------|
| Sound & Communication Technician..... | \$ 21.55 | 8.46 |

ELEC0317-012 05/30/2012

BOYD, CARTER, ELLIOT & ROWAN COUNTIES:

| | Rates | Fringes |
|--------------------|----------|---------|
| Electricians: | | |
| Cable Splicer..... | \$ 32.68 | 18.13 |
| Electrician..... | \$ 32.22 | 20.09 |

ELEC0369-007 05/30/2012

ANDERSON, BATH, BOURBON, BOYLE, BRECKINRIDGE, BULLITT, CARROLL,
CLARK, FAYETTE, FRAONKLIN, GRAYSON, HARDIN, HARRISON, HENRY,
JEFFERSON, JESSAMINE, LARUE, MADISON, MARION, MEADE, MERCER,
MONTGOMERY, NELSON, NICHOLAS, OLDHAM, OWEN, ROBERTSON, SCOTT,
SHELBY, SPENCER, TRIMBLE, WASHINGTON, & WOODFORD COUNTIES:

| | Rates | Fringes |
|-------------------------|----------|---------|
| ELECTRICIAN..... | \$ 29.32 | 13.78 |
| ----- | | |
| ELEC0575-002 12/31/2012 | | |

FLEMING, GREENUP, LEWIS & MASON COUNTIES:

| | Rates | Fringes |
|-------------------------|----------|---------|
| ELECTRICIAN..... | \$ 31.20 | 13.55 |
| ----- | | |
| ENGI0181-018 07/01/2012 | | |

| | Rates | Fringes |
|---------------------|----------|---------|
| Operating Engineer: | | |
| GROUP 1..... | \$ 27.35 | 13.40 |
| GROUP 2..... | \$ 24.87 | 13.40 |
| GROUP 3..... | \$ 25.26 | 13.40 |
| GROUP 4..... | \$ 24.60 | 13.40 |

OPERATING ENGINEER CLASSIFICATIONS

GROUP 1 - A-Frame Winch Truck; Auto Patrol; Backfiller; Batch Plant; Bituminous Paver; Bituminous Transfer Machine; Boom Cat; Bulldozer; Mechanic; Cableway; Carry-All Scoop; Carry Deck Crane; Central Compressor Plant; Cherry Picker; Clamshell; Concrete Mixer (21 cu. ft. or Over); Concrete Paver; Truck-Mounted Concrete Pump; Core Drill; Crane; Crusher Plant; Derrick; Derrick Boat; Ditching & Trenching Machine; Dragline; Dredge Operator; Dredge Engineer; Elevating Grader & Loaders; Grade-All; Gurrries; Heavy Equipment Robotics Operator/Mechanic; High Lift; Hoe-Type Machine; Hoist (Two or More Drums); Hoisting Engine (Two or More Drums); Horizontal Directional Drill Operator; Hydrocrane; Hyster; KeCal Loader; LeTourneau; Locomotive; Mechanic; Mechanically Operated Laser Screed; Mechanic Welder; Mucking Machine; Motor Scraper; Orangepeel Bucket; Overhead Crane; Piledriver; Power Blade; Pumpcrete; Push Dozer; Rock Spreader, attached to equipment; Rotary Drill; Roller (Bituminous); Rough Terrain Crane; Scarifier; Scoopmobile; Shovel; Side Boom; Subgrader; Tailboom; Telescoping Type Forklift; Tow or Push Boat; Tower Crane (French, German & other types); Tractor Shovel; Truck Crane; Tunnel Mining Machines, including Moles, Shields or similar types of Tunnel Mining Equipment

GROUP 2 - Air Compressor (Over 900 cu. ft. per min.); Bituminous Mixer; Boom Type Tamping Machine; Bull Float; Concrete Mixer (Under 21 cu. ft.); Dredge Engineer; Electric Vibrator; Compactor/Self-Propelled Compactor; Elevator (One Drum or Buck Hoist); Elevator (When used to Hoist Building Material); Finish Machine; Firemen & Hoist (One Drum); Flexplane; Forklift (Regardless of Lift Height); Form Grader; Joint Sealing Machine; Outboard Motor Boat; Power Sweeper (Riding Type); Roller (Rock); Ross Carrier; Skid Mounted or Trailer Mounted Concrete Pump; Skid Steer Machine with all Attachments; Switchman or Brakeman; Throttle Valve Person; Tractair & Road Widening Trencher;

Tractor (50 H.P. or Over); Truck Crane Oiler; Tugger;
Welding Machine; Well Points; & Whirley Oiler

GROUP 3 - All Off Road Material Handling Equipment,
including Articulating Dump Trucks; Greaser on Grease
Facilities servicing Heavy Equipment

GROUP 4 - Bituminous Distributor; Burlap & Curing Machine;
Cement Gun; Concrete Saw; Conveyor; Deckhand Oiler; Grout
Pump; Hydraulic Post Driver; Hydro Seeder; Mud Jack; Oiler;
Paving Joint Machine; Power Form Handling Equipment; Pump;
Roller (Earth); Steerman; Tamping Machine; Tractor (Under
50 H.P.); & Vibrator

CRANES - with booms 150 ft. & Over (Including JIB), and where
the length of the boom in combination with the length of
the piling leads equals or exceeds 150 ft. - \$1.00 over
Group 1 rate

EMPLOYEES ASSIGNED TO WORK BELOW GROUND LEVEL ARE TO BE PAID
10%

ABOVE BASIC WAGE RATE. THIS DOES NOT APPLY TO OPEN CUT WORK.

IRON0044-009 06/01/2012

BRACKEN, GALLATIN, GRANT, HARRISON, ROBERTSON,
BOURBON (Northern third, including Townships of Jackson,
Millersburg, Ruddel Mills & Shawhan);
CARROLL (Eastern third, including the Township of Ghent);
FLEMING (Western part, excluding Townships of Beechburg, Colfax,
Elizaville, Flemingsburg, Flemingsburg Junction, Foxport,
Grange City, Hillsboro, Hilltop, Mount Carmel, Muses Mills,
Nepton, Pecksridge, Plummers Landing, Plummers Mill, Poplar
Plains, Ringos Mills, Tilton & Wallingford);
MASON (Western two-thirds, including Townships of Dover,
Lewisburg, Mays Lick, Maysville, Minerva, Moranburg,
Murphysville, Ripley, Sardis, Shannon, South Ripley &
Washington);
NICHOLAS (Townships of Barefoot, Barterville, Carlisle,
Ellisville, Headquarters, Henryville, Morningglory, Myers &
Oakland Mills);
OWEN (Townships of Beechwood, Bromley, Fairbanks, Holbrook,
Jonesville, Long Ridge, Lusby's Mill, New, New Columbus, New
Liberty, Owenton, Poplar Grove, Rockdale, Sanders, Teresita &
Wheatley);
SCOTT (Northern two-thirds, including Townships of Biddle,
Davis, Delaplain, Elmville, Longlick, Muddy Ford, Oxford,
Rogers Gap, Sadieville, Skinnersburg & Stonewall)

| | Rates | Fringes |
|--------------------|----------|---------|
| IRONWORKER | | |
| Fence Erector..... | \$ 22.50 | 15.10 |
| Structural..... | \$ 24.80 | 15.10 |

IRON0070-006 06/01/2012

ANDERSON, BOYLE, BRECKINRIDGE, BULLITT, FAYETTE, FRANKLIN,
GRAYSON, HARDIN, HENRY, JEFFERSON, JESSAMINE, LARUE, MADISON,

MARION, MEADE, MERCER, NELSON, OLDHAM, SHELBY, SPENCER,
TRIMBLE, WASHINGTON & WOODFORD
BOURBON (Southern two-thirds, including Townships of Austerlity,
Centerville, Clintonville, Elizabeth, Hutchison, Littlerock,
North Middletown & Paris);
CARROLL (Western two-thirds, including Townships of Carrollton,
Easterday, English, Locust, Louis, Prestonville & Worthville);
CLARK (Western two-thirds, including Townships of Becknerville,
Flanagan, Ford, Pine Grove, Winchester & Wyandotte);
OWEN (Eastern eighth, including Townships of Glenmary, Gratz,
Monterey, Perry Park & Tacketts Mill);
SCOTT (Southern third, including Townships of Georgetown, Great
Crossing, Newtown, Stampling Ground & Woodlake);

| | Rates | Fringes |
|-----------------|----------|---------|
| IRONWORKER..... | \$ 26.34 | 18.58 |

IRON0372-006 06/01/2012

BRACKEN, GALLATIN, GRANT, HARRISON and ROBERTSON
BOURBON (Northern third, including Townships of Jackson,
Millersburg, Ruddel Mills & Shawhan);
CARROLL (Eastern third, including the Township of Ghent);
FLEMING (Western part, Excluding Townships of Beechburg, Colfax,
Elizaville, Flemingsburg, Flemingsburg Junction, Foxport,
Grange City, Hillsboro, Hilltop, Mount Carmel, Muses Mills,
Nepton, Pecksridge, Plummers Landing, Plummers Mill, Poplar
Plains,
Ringos Mills, Tilton & Wallingford);
MASON (Western two-thirds, including Townships of Dover,
Lewisburg, Mays Lick, Maysville, Minerva, Moranburg,
Murphysville, Ripley, Sardis, Shannon, South Ripley &
Washington);
NICHOLAS (Townships of Barefoot, Barterville, Carlisle,
Ellisville, Headquarters, Henryville, Morningglory, Myers &
Oakland Mills);
OWEN (Townships of Beechwood, Bromley, Fairbanks, Holbrook,
Jonesville, Long Ridge, Lusby's Mill, New, New Columbus, New
Liberty, Owenton, Poplar Grove, Rockdale, Sanders, Teresita &
Wheatley);
SCOTT (Northern two-thirds, including Townships of Biddle,
Davis, Delaplain, Elmville, Longlick, Muddy Ford, Oxford, Rogers
Gap, Sadieville, Skinnersburg & Stonewall) COUNTIES

| | Rates | Fringes |
|---|----------|---------|
| IRONWORKER, REINFORCING Beyond 30-mile radius of Hamilton County, Ohio Courthouse..... | \$ 26.59 | 18.58 |
| Up to & including 30-mile radius of Hamilton County, Ohio Courthouse..... | \$ 26.34 | 18.58 |

* IRON0769-007 12/01/2012

BATH, BOYD, CARTER, ELLIOTT, GREENUP, LEWIS, MONTGOMERY & ROWAN

CLARK (Eastern third, including townships of Bloomingdale, Hunt, Indian Fields, Kiddville, Loglick, Rightangele & Thomson);
FLEMING (Townships of Beechburg, Colfax, Elizaville, Flemingsburg, Flemingsburg Junction, Foxport, Grange City, Hillsboro, Hilltop, Mount Carmel, Muses Mills, Nepton, Pecksridge, Plummers Landing, Plummers Mill, Poplar Plains, Ringos Mills, Tilton & Wallingford);
MASON (Eastern third, including Townships of Helena, Marshall, Orangeburg, Plumville & Springdale);
NICHOLAS (Eastern eighth, including the Township of Moorefield Sprout)

| | Rates | Fringes |
|-------------------------|----------|---------|
| IRONWORKER..... | \$ 32.54 | 20.18 |
| ----- | | |
| LABO0189-003 07/01/2012 | | |

BATH, BOURBON, BOYD, BOYLE, BRACKEN, CARTER, CLARK, ELLIOTT, FAYETTE, FLEMING, FRANKLIN, GALLATIN, GRANT, GREENUP, HARRISON, JESSAMINE, LEWIS, MADISON, MASON, MERCER, MONTGOMERY, NICHOLAS, OWEN, ROBERTSON, ROWAN, SCOTT, & WOOLFORD COUNTIES

| | Rates | Fringes |
|--------------|----------|---------|
| Laborers: | | |
| GROUP 1..... | \$ 21.15 | 11.41 |
| GROUP 2..... | \$ 21.40 | 11.41 |
| GROUP 3..... | \$ 21.45 | 11.41 |
| GROUP 4..... | \$ 22.05 | 11.41 |

LABORERS CLASSIFICATIONS

GROUP 1 - Aging & Curing of Concrete; Asbestos Abatement Worker; Asphalt Plant; Asphalt; Batch Truck Dump; Carpenter Tender; Cement Mason Tender; Cleaning of Machines; Concrete; Demolition; Dredging; Environmental - Nuclear, Radiation, Toxic & Hazardous Waste - Level D; Flagperson; Grade Checker; Hand Digging & Hand Back Filling; Highway Marker Placer; Landscaping, Mesh Handler & Placer; Puddler; Railroad; Rip-rap & Grouter; Right-of-Way; Sign, Guard Rail & Fence Installer; Signal Person; Sound Barrier Installer; Storm & Sanitary Sewer; Swamper; Truck Spotter & Dumper; Wrecking of Concrete Forms; General Cleanup

GROUP 2 - Batter Board Man (Sanitary & Storm Sewer); Brickmason Tender; Mortar Mixer Operator; Scaffold Builder; Burner & Welder; Bushhammer; Chain Saw Operator; Concrete Saw Operator; Deckhand Scow Man; Dry Cement Handler; Environmental - Nuclear, Radiation, Toxic & Hazardous Waste - Level C; Forklift Operator for Masonary; Form Setter; Green Concrete Cutting; Hand Operated Grouter & Grinder Machine Operator; Jackhammer; Pavement Breaker; Paving Joint Machine; Pipelayer; Plastic Pipe Fusion; Power Driven Georgia Buggy & Wheel Barrow; Power Post Hole Digger; Precast Manhole Setter; Walk-Behind Tamper; Walk-Behind Trencher; Sand Blaster; Concrete Chipper; Surface Grinder; Vibrator Operator; Wagon Driller

GROUP 3 - Asphalt Luteman & Raker; Gunnite Nozzleman; Gunnite Operator & Mixer; Grout Pump Operator; Side Rail Setter; Rail Paved Ditches; Screw Operator; Tunnel (Free Air); Water Blaster

GROUP 4 - Caisson Worker (Free Air); Cement Finisher; Environmental - Nuclear, Radiation, Toxic & Hazardous Waste - Levels A & B; Miner & Driller (Free Air); Tunnel Blaster; & Tunnel Mucker (Free Air); Directional & Horizontal Boring; Air Track Drillers (All Types); Powdermen & Blasters; Troxler & Concrete Tester if Laborer is Utilized

LABO0189-008 07/01/2012

ANDERSON, BULLITT, CARROLL, HARDIN, HENRY, JEFFERSON, LARUE, MARION, MEADE, NELSON, OLDHAM, SHELBY, SPENCER, TRIMBLE & WASHINGTON COUNTIES

| | Rates | Fringes |
|--------------|----------|---------|
| Laborers: | | |
| GROUP 1..... | \$ 21.61 | 10.95 |
| GROUP 2..... | \$ 21.86 | 10.95 |
| GROUP 3..... | \$ 21.91 | 10.95 |
| GROUP 4..... | \$ 22.51 | 10.95 |

LABORERS CLASSIFICATIONS

GROUP 1 - Aging & Curing of Concrete; Asbestos Abatement Worker; Asphalt Plant; Asphalt; Batch Truck Dump; Carpenter Tender; Cement Mason Tender; Cleaning of Machines; Concrete; Demolition; Dredging; Environmental - Nuclear, Radiation, Toxic & Hazardous Waste - Level D; Flagperson; Grade Checker; Hand Digging & Hand Back Filling; Highway Marker Placer; Landscaping, Mesh Handler & Placer; Puddler; Railroad; Rip-rap & Grouter; Right-of-Way; Sign, Guard Rail & Fence Installer; Signal Person; Sound Barrier Installer; Storm & Sanitary Sewer; Swamper; Truck Spotter & Dumper; Wrecking of Concrete Forms; General Cleanup

GROUP 2 - Batter Board Man (Sanitary & Storm Sewer); Brickmason Tender; Mortar Mixer Operator; Scaffold Builder; Burner & Welder; Bushhammer; Chain Saw Operator; Concrete Saw Operator; Deckhand Scow Man; Dry Cement Handler; Environmental - Nuclear, Radiation, Toxic & Hazardous Waste - Level C; Forklift Operator for Masonary; Form Setter; Green Concrete Cutting; Hand Operated Grouter & Grinder Machine Operator; Jackhammer; Pavement Breaker; Paving Joint Machine; Pipelayer; Plastic Pipe Fusion; Power Driven Georgia Buggy & Wheel Barrow; Power Post Hole Digger; Precast Manhole Setter; Walk-Behind Tamper; Walk-Behind Trencher; Sand Blaster; Concrete Chipper; Surface Grinder; Vibrator Operator; Wagon Driller

GROUP 3 - Asphalt Luteman & Raker; Gunnite Nozzleman; Gunnite Operator & Mixer; Grout Pump Operator; Side Rail Setter; Rail Paved Ditches; Screw Operator; Tunnel (Free Air); Water Blaster

GROUP 4 - Caisson Worker (Free Air); Cement Finisher;
Environmental - Nuclear, Radiation, Toxic & Hazardous Waste
- Levels A & B; Miner & Driller (Free Air); Tunnel Blaster;
& Tunnel Mucker (Free Air); Directional & Horizontal
Boring; Air Track Drillers (All Types); Powdermen &
Blasters; Troxler & Concrete Tester if Laborer is Utilized

LABO0189-009 07/01/2012

BRECKINRIDGE & GRAYSON COUNTIES

| | Rates | Fringes |
|--------------|----------|---------|
| Laborers: | | |
| GROUP 1..... | \$ 21.96 | 10.60 |
| GROUP 2..... | \$ 22.21 | 10.60 |
| GROUP 3..... | \$ 22.26 | 10.60 |
| GROUP 4..... | \$ 22.86 | 10.60 |

LABORERS CLASSIFICATIONS

GROUP 1 - Aging & Curing of Concrete; Asbestos Abatement
Worker; Asphalt Plant; Asphalt; Batch Truck Dump; Carpenter
Tender; Cement Mason Tender; Cleaning of Machines;
Concrete; Demolition; Dredging; Environmental - Nuclear,
Radiation, Toxic & Hazardous Waste - Level D; Flagperson;
Grade Checker; Hand Digging & Hand Back Filling; Highway
Marker Placer; Landscaping, Mesh Handler & Placer; Puddler;
Railroad; Rip-rap & Grouter; Right-of-Way; Sign, Guard Rail
& Fence Installer; Signal Person; Sound Barrier Installer;
Storm & Sanitary Sewer; Swamper; Truck Spotter & Dumper;
Wrecking of Concrete Forms; General Cleanup

GROUP 2 - Batter Board Man (Sanitary & Storm Sewer);
Brickmason Tender; Mortar Mixer Operator; Scaffold Builder;
Burner & Welder; Bushhammer; Chain Saw Operator; Concrete
Saw Operator; Deckhand Scow Man; Dry Cement Handler;
Environmental - Nuclear, Radiation, Toxic & Hazardous Waste
- Level C; Forklift Operator for Masonary; Form Setter;
Green Concrete Cutting; Hand Operated Grouter & Grinder
Machine Operator; Jackhammer; Pavement Breaker; Paving
Joint Machine; Pipelayer; Plastic Pipe Fusion; Power Driven
Georgia Buggy & Wheel Barrow; Power Post Hole Digger;
Precast Manhole Setter; Walk-Behind Tamper; Walk-Behind
Trencher; Sand Blaster; Concrete Chipper; Surface Grinder;
Vibrator Operator; Wagon Driller

GROUP 3 - Asphalt Luteman & Raker; Gunnite Nozzleman;
Gunnite Operator & Mixer; Grout Pump Operator; Side Rail
Setter; Rail Paved Ditches; Screw Operator; Tunnel (Free
Air); Water Blaster

GROUP 4 - Caisson Worker (Free Air); Cement Finisher;
Environmental - Nuclear, Radiation, Toxic & Hazardous Waste
- Levels A & B; Miner & Driller (Free Air); Tunnel Blaster;
& Tunnel Mucker (Free Air); Directional & Horizontal
Boring; Air Track Drillers (All Types); Powdermen &
Blasters; Troxler & Concrete Tester if Laborer is Utilized

PAIN0012-005 06/11/2005

BATH, BOURBON, BOYLE, CLARK, FAYETTE, FLEMING, FRANKLIN,
HARRISON, JESSAMINE, MADISON, MERCER, MONTGOMERY, NICHOLAS,
ROBERTSON, SCOTT & WOODFORD COUNTIES:

| | Rates | Fringes |
|--|----------|---------|
| PAINTER | | |
| Bridge/Equipment Tender and/or Containment Builder.. | \$ 18.90 | 5.90 |
| Brush & Roller..... | \$ 21.30 | 5.90 |
| Elevated Tanks; Steeplejack Work; Bridge & Lead Abatement..... | \$ 22.30 | 5.90 |
| Sandblasting & Waterblasting..... | \$ 22.05 | 5.90 |
| Spray..... | \$ 21.80 | 5.90 |

PAIN0012-017 05/01/2012

BRACKEN, GALLATIN, GRANT, MASON & OWEN COUNTIES:

| | Rates | Fringes |
|--|----------|---------|
| PAINTER (Heavy & Highway Bridges - Guardrails - Lightpoles - Striping) | | |
| Bridge Equipment Tender and Containment Builder..... | \$ 20.49 | 8.33 |
| Brush & Roller..... | \$ 23.10 | 8.33 |
| Elevated Tanks; Steeplejack Work; Bridge & Lead Abatement..... | \$ 24.10 | 8.33 |
| Sandblasting & Water Blasting..... | \$ 23.85 | 8.33 |
| Spray..... | \$ 23.60 | 8.33 |

PAIN0118-004 05/01/2010

ANDERSON, BRECKINRIDGE, BULLITT, CARROLL, GRAYSON, HARDIN,
HENRY, JEFFERSON, LARUE, MARION, MEADE, NELSON, OLDHAM, SHELBY,
SPENCER, TRIMBLE & WASHINGTON COUNTIES:

| | Rates | Fringes |
|---|----------|---------|
| PAINTER | | |
| Brush & Roller..... | \$ 18.50 | 10.30 |
| Spray, Sandblast, Power Tools, Waterblast & Steam Cleaning..... | \$ 19.50 | 10.30 |

PAIN1072-003 12/01/2012

BOYD, CARTER, ELLIOTT, GREENUP, LEWIS and ROWAN COUNTIES

Rates Fringes

Painters:

| | | |
|------------------------------|----------|-------|
| Bridges; Locks; Dams; | | |
| Tension Towers & Energized | | |
| Substations..... | \$ 30.18 | 14.65 |
| Power Generating Facilities. | \$ 26.94 | 14.65 |

PLUM0248-003 06/01/2012

BOYD, CARTER, ELLIOTT, GREENUP, LEWIS & ROWAN COUNTIES:

| | | |
|------------------------------|----------|---------|
| | Rates | Fringes |
| Plumber and Steamfitter..... | \$ 33.00 | 16.93 |

PLUM0392-007 06/01/2012

BRACKEN, CARROLL (Eastern Half), GALLATIN, GRANT, MASON, OWEN & ROBERTSON COUNTIES:

| | | |
|-------------------------------|----------|---------|
| | Rates | Fringes |
| Plumbers and Pipefitters..... | \$ 29.30 | 16.59 |

PLUM0502-003 08/01/2012

BRECKINRIDGE, BULLITT, CARROLL (Western Half), FRANKLIN (Western three-fourths), GRAYSON, HARDIN, HENRY, JEFFERSON, LARUE, MARION, MEADE, NELSON, OLDHAM, SHELBY, SPENCER, TRIMBLE & WASHINGTON COUNTIES

| | | |
|--------------|----------|---------|
| | Rates | Fringes |
| PLUMBER..... | \$ 32.00 | 16.17 |

SUKY2010-160 10/08/2001

| | | |
|----------------|----------|---------|
| | Rates | Fringes |
| Truck drivers: | | |
| GROUP 1..... | \$ 16.57 | 7.34 |
| GROUP 2..... | \$ 16.68 | 7.34 |
| GROUP 3..... | \$ 16.86 | 7.34 |
| GROUP 4..... | \$ 16.96 | 7.34 |

TRUCK DRIVER CLASSIFICATIONS

GROUP 1 - Mobile Batch Truck Tender

GROUP 2 - Greaser; Tire Changer; & Mechanic Tender

GROUP 3 - Single Axle Dump; Flatbed; Semi-trailer or Pole Trailer when used to pull building materials and equipment; Tandem Axle Dump; Distributor; Mixer; & Truck Mechanic

GROUP 4 - Euclid & Other Heavy Earthmoving Equipment & Lowboy; Articulator Cat; 5-Axle Vehicle; Winch & A-Frame when used in transporting materials; Ross Carrier; Forklift when used to transport building materials; & Pavement

Breaker

WELDERS - Receive rate prescribed for craft performing
operation to which welding is incidental.

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Unlisted classifications needed for work not included within
the scope of the classifications listed may be added after
award only as provided in the labor standards contract clauses
(29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification
and wage rates that have been found to be prevailing for the
cited type(s) of construction in the area covered by the wage
determination. The classifications are listed in alphabetical
order of "identifiers" that indicate whether the particular
rate is union or non-union.

Union Identifiers

An identifier enclosed in dotted lines beginning with
characters other than "SU" denotes that the union
classification and rate have found to be prevailing for that
classification. Example: PLUM0198-005 07/01/2011. The first
four letters , PLUM, indicate the international union and the
four-digit number, 0198, that follows indicates the local union
number or district council number where applicable , i.e.,
Plumbers Local 0198. The next number, 005 in the example, is
an internal number used in processing the wage determination.
The date, 07/01/2011, following these characters is the
effective date of the most current negotiated rate/collective
bargaining agreement which would be July 1, 2011 in the above
example.

Union prevailing wage rates will be updated to reflect any
changes in the collective bargaining agreements governing the
rates.

0000/9999: weighted union wage rates will be published annually
each January.

Non-Union Identifiers

Classifications listed under an "SU" identifier were derived
from survey data by computing average rates and are not union
rates; however, the data used in computing these rates may
include both union and non-union data. Example: SULA2004-007
5/13/2010. SU indicates the rates are not union majority rates,
LA indicates the State of Louisiana; 2004 is the year of the
survey; and 007 is an internal number used in producing the

wage determination. A 1993 or later date, 5/13/2010, indicates the classifications and rates under that identifier were issued as a General Wage Determination on that date.

Survey wage rates will remain in effect and will not change until a new survey is conducted.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor

200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

Fringe benefit amounts are applicable for all hours worked except when otherwise noted.

These rates are listed pursuant to the Kentucky Determination No. CR-III-III- HWY dated September 5, 2012.

No laborer, workman or mechanic shall be paid at a rate less than that of a Journeyman except those classified as bona fide apprentices.

Apprentices or trainees shall be permitted to work as such subject to Administrative Regulations adopted by the Commissioner of Workplace Standards. Copies of these regulations will be furnished upon request from any interested person.

Before using apprentices on the job the contractor shall present to the Contracting Officer written evidence of registration of such employees in a program of a State apprenticeship and training agency approved and recognized by the U. S. Bureau of Apprenticeship and Training. In the absence of such a State agency, the contractor shall submit evidence of approval and registration by the U. S. Bureau of Apprenticeship and Training.

The contractor shall submit to the Contracting Officer, written evidence of the established apprenticeship-journeyman ratios and wage rates in the project area, which will be the basis for establishing such ratios and rates for the project under the applicable contract provisions.

TO: EMPLOYERS/EMPLOYEES

PREVAILING WAGE SCHEDULE:

The wages indicated on this wage schedule are the least permitted to be paid for the occupations indicated. When an employee works in more than one classification, the employer must record the number of hours worked in each classification at the prescribed hourly base rate.

OVERTIME:

Overtime is to be paid after an employee works eight (8) hours a day or forty (40) hours a week, whichever gives the employee the greater wages. At least time and one-half the base rate is required for all overtime. A laborer, workman or mechanic and an employer may enter into a written agreement or a collective bargaining agreement to work more than eight (8) hours a calendar day but not more than ten (10) hours a calendar day for the straight time hourly rate. Wage violations or questions should be directed to the designated Engineer or the undersigned.

Ryan Griffith, Director
Division of Construction Procurement
Frankfort, Kentucky 40622

**NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION
TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY
(Executive Order 11246)**

1. The Offeror's or Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Specifications" set forth herein.
2. The goals and timetables for minority and female participation, expressed in percentage terms for the Contractor's aggregate work force in each trade on all construction work in the covered area, are as follows:

| GOALS FOR MINORITY PARTICIPATION IN EACH TRADE | GOALS FOR FEMALE PARTICIPATION IN EACH TRADE |
|---|---|
| 11.2% | 6.9% |

These goals are applicable to all the Contractor's construction work (whether or not it is Federal or federally-assisted) performed in the covered area. If the contractor performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for such geographical area where the work is actually performed. With regard to this second area, the contractor also is subject to the goals for both its federally involved and non-federally involved construction.

The Contractor's compliance with the Executive Order and the regulations in CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4, 3(a), and its efforts to meet the goals. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade, and the contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, the Executive Order and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

3. The Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs within ten (10) working days of award of any construction subcontract in excess of \$10,000.00 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the name, address and telephone number of the subcontractor; employer identification number of the subcontractor; estimated dollar amount of the subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the subcontract is to be performed. The notification shall be mailed to:

**Evelyn Teague, Regional Director
Office of Federal Contract Compliance Programs
61 Forsyth Street, SW, Suite 7B75
Atlanta, Georgia 30303-8609**

4. As used in this Notice, and in the contract resulting from this solicitation, the "**covered area**" is Jefferson County.

PART IV
INSURANCE

INSURANCE

The Contractor shall procure and maintain the following insurance in addition to the insurance required by law:

- 1) Commercial General Liability-Occurrence form – not less than \$2,000,000 General aggregate, \$2,000,000 Products & Completed Aggregate, \$1,000,000 Personal & Advertising, \$1,000,000 each occurrence.
- 2) Automobile Liability- \$1,000,000 per accident
- 3) Employers Liability:
 - a) \$100,000 Each Accident Bodily Injury
 - b) \$500,000 Policy limit Bodily Injury by Disease
 - c) \$100,000 Each Employee Bodily Injury by Disease
- 4) The insurance required above must be evidenced by a Certificate of Insurance and this Certificate of Insurance must contain one of the following statements:
 - a) "policy contains no deductible clauses."
 - b) "policy contains _____ (amount) deductible property damage clause but company will pay claim and collect the deductible from the insured."
- 5) **KENTUCKY WORKMEN'S COMPENSATION INSURANCE.** The contractor shall furnish evidence of coverage of all his employees or give evidence of self-insurance by submitting a copy of a certificate issued by the Workmen's Compensation Board.

The cost of insurance is incidental to all contract items. All subcontractors must meet the same minimum insurance requirements.

PART V
BID ITEMS

PROPOSAL BID ITEMS

131037

Page 1 of 1

Report Date 5/13/13

Section: 0001 - PARK LANDS

| LINE | BID CODE | ALT | DESCRIPTION | QUANTITY | UNIT | UNIT PRICE | FP | AMOUNT |
|------|----------|-----|-----------------------------|----------|------|------------|----|--------|
| 0010 | 10202ND | | TIME COMPONENTUNIT = DOLLAR | 3,000.00 | DOLL | | \$ | |
| 0020 | 24101EC | | BASE BID | 1.00 | LS | | \$ | |

Section: 0002 - DEMOBILIZATION

| LINE | BID CODE | ALT | DESCRIPTION | QUANTITY | UNIT | UNIT PRICE | FP | AMOUNT |
|------|----------|-----|--|----------|------|------------|----|--------|
| 0030 | 02569 | | DEMOBILIZATIONMUST BE EXACTLY 3% OF BASE BID. | 1.00 | LS | | \$ | |

Section: 0003 - ADDITIVE ALTERNATES

| LINE | BID CODE | ALT | DESCRIPTION | QUANTITY | UNIT | UNIT PRICE | FP | AMOUNT |
|------|----------|-----|-----------------------------|----------|------|------------|----|--------|
| 0040 | 30063 | | ADDITIVE ALTERNATEOPTION #1 | 1.00 | L S | | \$ | |
| 0050 | 30063 | | ADDITIVE ALTERNATEOPTION #2 | 1.00 | L S | | \$ | |