

PROJECT MANUAL

Fayetteville Regional Airport

A.I.P No. 3-37-0021-046-2019

AIRLINE TERMINAL IMPROVEMENTS – Part 2



Owner:

THE CITY OF FAYETTEVILLE

Architect of Record:

***GORDON JOHNSON ARCHITECTURE
FAYETTEVILLE, NC***

Civil Engineer:

***CRAWFORD DESIGN COMPANY
FAYETTEVILLE, NC***

Structural Engineer:

***FLEMING & ASSOCIATES
FAYETTEVILLE, NC***

Mechanical / Electrical / Fire Protection Engineer:

***RMF ENGINEERING
CHARLOTTE, NC***

Volume One of Three

July 15, 2019

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Fayetteville, North Carolina
Gordon Johnson Architecture

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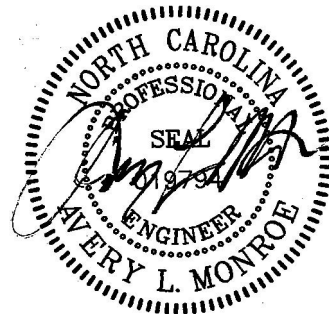
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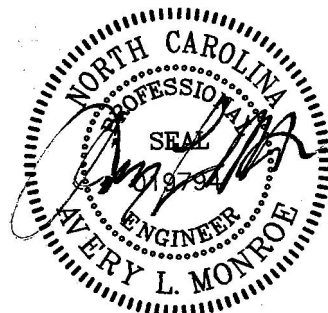
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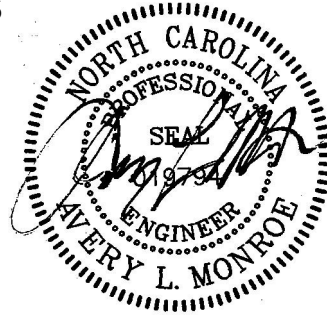
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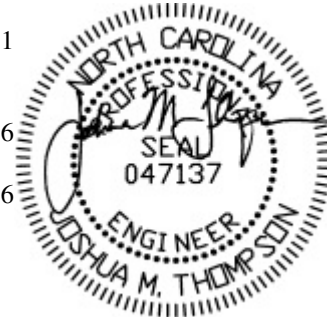
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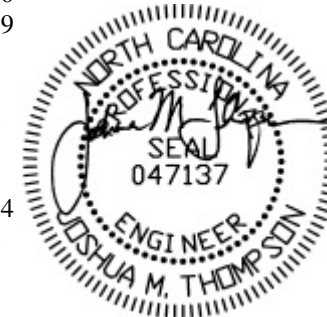
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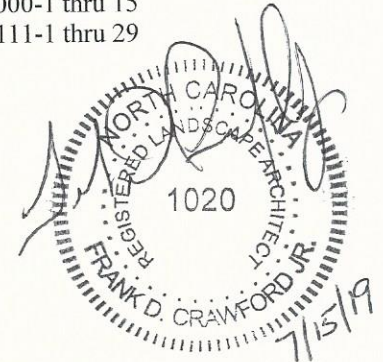
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- B – Bid Proposal Form, Partial Schedule of Values & Bidder Information Sheet
- C – DBE Program Requirements & Compliance Forms
- D – Federal Contract Requirements & Iran Divestment Act Form
- E – Contract for Construction & Payment & Performance Bond Forms
- F – Required Forms (Post Award)
- G – CSPP
- * – Subsurface & Environmental Reports are referenced in Project Special Provisions

END OF DOCUMENT

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INSTRUCTIONS TO BIDDERS

1. PROPOSAL

Proposals shall be made in strict accordance with the "Bid Proposal Package" provided herein, and all blank spaces for bids, alternates and unit prices shall be properly filled in. When requested alternates are not bid, the proposal may be considered incomplete. Any modifications to the "Bid Proposal Package" (including alternates and/or unit prices) will disqualify the bid and shall cause the bid to be rejected.

The Bidder agrees that the "Bid Proposal Package" detached from plans & specifications will be considered and will have the same force and effect as if attached thereto. Photocopied or faxed proposals will not be considered. Numbers shall be stated both in writing and in figures for the base bids and alternates.

Unit / Bid Alternate prices quoted in the "Bid Proposal Package" shall include labor, equipment, materials, miscellaneous expenses, overhead, profit and taxes and shall be the full compensation for the Bidder's cost involved in the work.

Proposals may be rejected if they show omissions, alterations of form, additions not called for, conditional bids, or irregularities of any kind.

Appendix B – Bid Certifications pages B-1 through B-11 included in the Appendix section of Volume Three are certifications which must be included with the bid.

2. EXAMINATION OF CONDITIONS

By submitting a bid, the Bidder is affirming that he has carefully examined all documents pertaining to the work, the location, accessibility and general character of the site of the work and all existing buildings and structures within and adjacent to the site, and has satisfied himself as to the nature of the work, the condition of existing buildings and structures, the conformation of the ground, the character, quality and quantity of the material to be encountered, the character of the equipment, machinery, plant, and any other facilities needed preliminary to and during prosecution of the work, the general and local conditions, the construction hazards, and all other matters, including but not limited to the labor situation which can in any way affect the work under the contract, and including all safety measures required by the Occupational Safety and Health Act of 1970 and all rules and regulations issued pursuant thereto. The Bidder further affirms by submitting a proposal that he has satisfied himself as to the feasibility and meaning of the plans,

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drawings, specifications, and other contract documents for the construction of work and that he accepts all the terms, conditions and stipulations contained therein, and that he is prepared to work in cooperation with other Contractors performing work on the site.

Reference is made to contract documents for the identification of those surveys and investigative reports of subsurface or latent physical conditions at the site or otherwise affecting performance of the work which have been relied upon by the Designer in preparing the documents. The City will make copies of all such surveys and reports available to the Bidder upon request. Each Bidder may, at his own expense, make such additional surveys and investigations as he may deem necessary to determine his bid price for the performance of the work. Any on-site investigation shall be done at the convenience of the Airport and the City. Any reasonable request for access to the site will be honored by the Airport and the City.

3. FAMILIARITY WITH LAWS

The bidder is assumed to have made himself familiar with all laws, ordinances, and regulations which in any manner affect those engaged or employed in the work or the materials or equipment used in or upon the work, or in any way affects the conduct of the work.

4. PREPARATION OF PROPOSAL

The bidder must submit his bid proposal on the blank forms herewith provided, and prices must be given both in writing and in figures (if requested). The bidder shall sign his proposal correctly. If the proposal is made by an individual, his name and address must be shown. If made by a corporation, the person signing shall state under the laws of what state the corporation was chartered, the location of the home office, and the name and title of officers having authority under the bylaws to sign contracts. Wet seals (vs raised seals) for corporate and notary seals on bid forms are acceptable.

5. LICENSING

The successful Contractor must be properly licensed to do the work in accordance with the North Carolina General Statutes (Chapter 87, Article 1). Upon request, bidders shall show evidence of proper license type and limitation.

6. BULLETINS AND ADDENDA

Any addenda to plans and specifications issued during the time of bidding are to be considered covered in the proposal and in closing a contract they will become a part thereof. It shall be the Bidder's responsibility to ascertain prior to bid time the addenda issued and to see that his bid includes any changes thereby required.

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Should the bidder find discrepancies in, or omission from, the drawings or documents or should he be in doubt as to their meaning, he shall at once notify the Contracting Office who will send written instructions in the form of addenda to all bidders. Notification should be no later than seven (7) days from the date set for receipt of bids. Neither the City nor the Purchasing Office will be responsible for any oral instructions. All addenda shall be acknowledged by the Bidder(s) on the Proposal Form.

7. BID SECURITY

Each proposal shall be accompanied by a cash deposit, or a certified check drawn on some bank or trust company insured by the Federal Deposit Insurance Corporation, or a bid bond executed by a corporate surety licensed under the laws of North Carolina to execute such bonds in an amount equal to not less than five percent (5%) of the bid. Bid Bonds shall be conditioned that the Surety will, upon demand, forthwith make payment to the obligee upon said bond if the bidder fails to execute the contract within ten (10) days after the award or to give satisfactory surety as required by law (G.S. 143-129).

All bid securities except those of the three (3) lowest responsible bidders will be returned within five (5) days after the opening of the bids. The remaining bid securities, except that of the successful bidder, will be returned within five (5) working days after the award of the contract.

8. DELIVERY OF PROPOSAL

Each proposal must be submitted in a sealed opaque envelope so marked as to indicate its contents, project number, project title, bidder's name, address, contractor's license number and status. Bids may be mailed or delivered in person to the Airport Director, Attn: Bradley Whited, Fayetteville Regional Airport, 400 Airport Road, Fayetteville, NC 28306.

The City of Fayetteville will not be responsible for picking up bids at the post office. Bids arriving after the specific time designated for opening shall not be considered.

9. RECEIPT OF BIDS

Bids shall be received in strict accordance with requirements of the General Statutes of North Carolina under the single-prime contracting system only.

10. WITHDRAWAL OF PROPOSAL

If the bidder desires to withdraw his proposal, he must do so before the time fixed for the receipt of bids, without prejudice to himself by communicating his purpose

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in writing to the City, and when received it shall be handed to him or to his authorized agent unread. After bids are opened, bids may only be withdrawn in accordance with N.C.G.S. Section 143-129.1. Otherwise, bids may not be withdrawn after the time for receipt for a period of one hundred twenty (120) days.

11. BID OPENING

Bids will be opened publicly and read at the hour and on the date set in the advertisement in the 1st floor Conference Room of the Airport Terminal Building, 400 Airport Road, Fayetteville, North Carolina. Bidders or their authorized agents are invited to be present. Late bids will not be considered and will be returned to the Bidder unopened. Upon opening, all bids shall be read aloud and become the property of the City. Bids will not be returned to the Bidder. Bids must be held firm for acceptance by the City of Fayetteville (City) for a period of one hundred twenty (120) days after bid opening date.

12. BID EVALUATION

The City may award bid on the basis of the base bid and any alternates the City chooses. Before awarding a contract, the City may require the apparent low bidder to requalify himself to be a responsible bidder by furnishing the documentary data listed below:

- (1) An up-to-date financial statement or other documentation showing assets and liabilities of the Company and any open claims made against the same.
- (2) A list of three successfully completed projects of similar scope and nature.
- (3) Permanent name and address of place of business.
- (4) The number of employees of the organization and length of time the organization has been in business under the present name.
- (5) The name and address of the surety proposed and the name and address of the responsible local adjuster for insurance claims.
- (6) The names of members of the firm who hold appropriate trade licenses, together with license numbers.
- (7) An affidavit stating whether or not any OSHA or TSA security violations have occurred within the past three years.

Failure or refusal to furnish any items of information requested by the City shall constitute a basis for disqualification of any bidder.

Should the City adjudge that the apparent low bidder is not the lowest responsible bidder by virtue of the above information requested, said apparent low bidder will be so notified and his bid security shall be returned to him.

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Should the successful bidder default and fail to execute a contract, the contract may be awarded to the next lowest and responsible bidder.

13. MATERIAL GUARANTY

Before the award of contract, the successful bidder, when requested, shall furnish a complete statement of the origin, composition, and manufacturer of any and all materials to be used in the construction of the project together with samples, which samples may be subjected to the tests provided for in these specifications to determine their quality and fitness for the work. All materials furnished must meet or exceed quality required by the latest specifications of the North Carolina Department of Transportation.

BUY AMERICAN PREFERENCE

The contractor agrees to comply with 49 USC § 50101, which provides that Federal funds may not be obligated unless all steel and manufactured goods used in AIP funded projects are produced in the United States, unless the FAA has issued a waiver for the product; the product is listed as an Excepted Article, Material Or Supply in Federal Acquisition Regulation subpart 25.108; or is included in the FAA Nationwide Buy American Waivers Issued list. A bidder or offeror must complete and submit the Buy America certification included herein with their bid or offer. The Owner will reject as nonresponsive any bid or offer that does not include a completed Certificate of Buy American Compliance.

A1.1.1 Certificate of Buy American Compliance – Total Facility

14. DISQUALIFICATION OF BIDDERS

More than one proposal from an individual, a firm or partnership, a corporation, or an association under the same or different names will not be considered. Reasonable grounds for believing that any bidder is interested in more than one proposal for the work contemplated will cause the rejection of all proposals in which such bidder is interested. Any or all proposals will be rejected if there is reason for believing that collusion exists among the bidders, and all participants in such collusion will not be considered in future proposals for the same work. No contract will be awarded except to competent bidders capable of performing the class of work contemplated.

15. UNBALANCED BIDS

The City reserves the right to reject any bid determined to be unbalanced. In the event that an unbalanced bid is determined to be the lowest responsible bid, the City reserves the right to request negotiation of the particular line item(s) disputed.

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16. RIGHT TO REJECT PROPOSALS

The City reserves the unqualified right to reject any and all bids. Reasons for rejection may include, but shall not be limited to, the following:

- a. If the "Bid Proposal Package" furnished to the bidder is not used or is altered.
- b. If the bidder fails to insert a price for all bid items, alternate and unit prices requested.
- c. If the bidder adds any provisions reserving the right to accept or reject any award.
- d. If there are unauthorized additions or conditions to the bid or irregularities of any kind which tend to make the proposal incomplete, indefinite, or ambiguous as to its meaning.
- e. If the bidder fails to complete the proposal form where information is requested so the bid may be properly evaluated by the City.
- f. If the unit prices contained in the bid are unacceptable to the City.
- g. If the bidder fails to comply with other instructions stated herein.

- 17.** Contractor hereby acknowledges that "E-Verify" is the federal E-Verify program operated by the US Department of Homeland Security and other federal agencies which is used to verify the work authorization of newly hired employees pursuant to federal law and in accordance with Article 2, Chapter 64 of the North Carolina General Statutes. Contractor further acknowledges that all employers, as defined by Article 2, Chapter 64 of the North Carolina General Statutes, must use e-verify and after hiring an employee to work in the United States, shall verify the work authorization of the employee through E-Verify in accordance with NCGS §64-26(a). Contractor hereby pledges, attests and warrants through execution of this Agreement that Contractor complies with the requirements of Article 2 of Chapter 64 of the North Carolina General Statutes and further pledges, attests and warrants that any subcontractors currently employed by or subsequently hired by Contractor shall comply with any and all E-Verify requirements. Failure to comply with the above requirements shall be considered a breach of this Agreement.

18. DBE PARTICIPATION

The City of Fayetteville has a 10% goal for small, minority and women owned business participation.

Policy. It is the policy of the City of Fayetteville that disadvantaged business enterprises, as defined in 49 CFR Part 26, shall have the maximum opportunity to

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participate in the performance of contracts and subcontracts. Consequently, the DBE requirements of 49 CFR Part 26 apply to this contract.

A separate contract goal of 8.4 % DBE participation has been established for this procurement.

Once the contract is awarded the approved DBE participation submitted by the Contractor shall be the contract requirement.

Only Disadvantaged Business Enterprise (DBE) firms with current certification through the North Carolina Department of Transportation will be considered to meet the contract goal. Certified firms are listed in the North Carolina Department of Transportation “Directory of Transportation Firms” which can be accessed through the following website: <https://apps.dot.state.nc.us/vendor/directory/>.

The bidder shall make good faith efforts, as defined in 49 CFR Part 26, Regulations of the Office of the Secretary of Transportation, to subcontract the percentage of the dollar value stated herein of the prime contract to small certified business concerns owned and controlled by socially and economically disadvantaged individuals (DBE). In the event that the bidder for this solicitation qualifies as a DBE, the contract goal shall be deemed to have been met.

Individuals who are rebuttably presumed to be socially and economically disadvantaged include: Women, Blacks, Hispanics, Native Americans, Asian-pacific Americans, and Asian-Indian Americans. The apparent successful bidder will be required to submit (with the bid) information concerning the DBE’S that will participate in this contract. The information will include the name and address of each DBE, a description of the work to be performed by each named firm, and the dollar value of the contract. If the bidder fails to achieve the contract goal stated herein, it will be required to provide documentation demonstrating that it made good faith efforts in attempting to do so. A bid that fails to meet these requirements will be considered non-responsive.

Bidder shall submit, with his Proposal, the Disadvantaged Business Enterprise documentation requested in these specifications. It is strongly recommended that personnel within your company who are responsible for compliance with these requirements attend the pre-bid, as important information will be reviewed. Failure to submit the DBE documentation, included herein, may result in disqualification of the proposal. Questions regarding this shall be directed to Kimberly Toon, Purchasing Agent (City of Fayetteville), at (910) 433-1942.

END OF SECTION

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SECTION 10

DEFINITION OF TERMS

Whenever the following terms are used in these specifications, in the contract, or in any documents or other instruments pertaining to construction where these specifications govern, the intent and meaning shall be interpreted as follows:

- 10-01 AASHTO.** The American Association of State Highway and Transportation Officials, the successor association to AASHO.
- 10-02 Access Road.** The right-of-way, the roadway and all improvements constructed thereon connecting the airport to a public highway.
- 10-03 Advertisement.** A public announcement, as required by local law, inviting bids for work to be performed and materials to be furnished.
- 10-04 Airport Improvement Program (AIP).** A grant-in-aid program, administered by the Federal Aviation Administration (FAA).
- 10-05 Air Operations Area (AOA).** For the purpose of these specifications, the term air operations area (AOA) shall mean any area of the airport used or intended to be used for the landing, takeoff, or surface maneuvering of aircraft. An air operation area shall include such paved or unpaved areas that are used or intended to be used for the unobstructed movement of aircraft in addition to its associated runway, taxiway, or apron.
- 10-06 Airport.** Airport means an area of land or water which is used or intended to be used for the landing and takeoff of aircraft; an appurtenant area used or intended to be used for airport buildings or other airport facilities or rights of way; and airport buildings and facilities located in any of these areas, and includes a heliport.
- 10-07 ASTM International (ASTM).** Formerly known as the American Society for Testing and Materials (ASTM).
- 10-08 Award.** The OWNER's notice to the successful bidder of the acceptance of the submitted bid.
- 10-09 Bidder.** Any individual, partnership, firm, or corporation, acting directly or through a duly authorized representative, who submits a proposal for the work contemplated.
- 10-10 Building Area.** An area on the airport to be used, considered, or intended to be used for airport buildings or other airport facilities or rights-of-way together

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with all airport buildings and facilities located thereon.

10-11 Calendar Day. Every day shown on the calendar. The contract duration and phase durations set forth in the Contract Documents include inclement weather days normally encountered at the Project site, as well as observed holidays defined below. The Contractor shall be charged for each calendar day during the term of construction including observed holidays defined below and inclement weather days normally encountered at the Project site. ***The number of contract “Planned Lost Days” presume that the singular critical path for the Part 2 construction activities mostly occurs “indoors” and not subject delay caused by inclement weather conditions.***

1. For calculation purposes the date of the Notice to Proceed shall be counted as day one (1) of the contract period.

2. The number of days denoted in the Contract for contract time includes all weekend days and observed holidays. Observed holidays for which a calendar day shall be charged but which the Contractor shall not be allowed to work are as follows: New Year's Day; Memorial Day and the Saturday/Sunday prior to Memorial Day; July 4th; Labor Day and the Saturday/Sunday prior to Labor Day; Thanksgiving and the Friday and Saturday after Thanksgiving; and Christmas Day.

3. For the purposes of this contract, weather shall be factored into the time(s) of performance as follows:

a. A day will be considered as “lost” for scheduling purposes if more than 0.1 inch of rainfall (or equivalent frozen precipitation) is recorded as having fallen in a day by the NOAA weather station at the Fayetteville Regional Airport. A “day” means a calendar day including weekdays, weekend days and holidays, and begins at 12:01 A.M. and ends at the following 12:00 A.M.

b. A day will be considered as “lost” for scheduling purposes if the Contractor cannot work at least 50% of the normal workday on pre-determined controlling work items due to abnormal inclement weather conditions. A day will be considered “worked” even if no Work is done in days when less than 0.1 inch of rainfall is recorded.

c. The Contractor shall assume the following number of “lost” days when developing the project schedule:

Month	Planned days	“Lost”	Month	Planned days	“Lost”
January	5 days		July	2 days	
February	4 days		August	2 days	
March	5 days		September	5 days	
April	5 days		October	5 days	

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May	4 days	November	4 days
June	3 days	December	4 days

These days will be considered as planned lost days in developing the schedule(s) for completing the Work within the Contract Time including project phases and should be shown in the schedule.

d. Time will be monitored on a monthly basis by the Owner's Representative for days lost beyond the planned lost days. Time adjustments will be immediately reflected on the Contractor's project schedule. The monthly assessment of "lost" days will be tracked cumulatively for the project duration. Any accumulated lost weather days in excess of the shown in paragraph "C" will be granted to the Contractor at the end of the Contract period. Any extensions of Contract Time for lost days due to weather will be non-compensable. ***"Lost Days" will only be granted to the Contractor when weather conditions impact the approved Contractor singular critical path work activities.***

e. Time for planned lost time weather days that are not used as outlined in paragraph "C" above will be adjusted on a monthly basis and will be considered added accumulative float time that belongs to the Owner.

f. For purposes of establishing weather delays, weekdays, weekend days and holidays are all considered as equal.

- 10-12 Change Order.** A written order to the Contractor covering changes in the plans, specifications, or proposal quantities and establishing the basis of payment and contract time adjustment, if any, for the work affected by such changes. The work, covered by a change order, must be within the scope of the contract.
- 10-13 Contract.** The written agreement covering the work to be performed. The awarded contract shall include, but is not limited to: Advertisement, Contract Form, Proposal, Performance Bond, Payment Bond, any required insurance certificates, Specifications, Plans, and any addenda issued to bidders.
- 10-14 Contract Item (Pay Item).** A specific unit of work for which a price is provided in the contract, *for which a value is defined in the Contractor's accepted schedule of values, or which is defined within a change order or supplemental agreement.*
- 10-15 Contract Time.** The number of calendar days allowed for completion of the contract, including authorized time extensions. The contract time for the construction of the Part 2 Terminal construction is as follows:

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	Start	End
Notice to Proceed	Calendar Day 1	N/A
Substantial Completion of all Base Bid work	Calendar Day XXX	N/A
Complete Final Punch List	Calendar Day XXX	Calendar Day XXX
Final Acceptance	Calendar Day XXX	N/A

- 10-16 Contractor.** The individual, partnership, firm, or corporation primarily liable for the acceptable performance of the work contracted and for the payment of all legal debts pertaining to the work who acts directly or through lawful agents or employees to complete the contract work.
- 10-17 Contractor's Laboratory.** The Contractor's *independent* quality control laboratory.
- 10-18 Construction Safety and Phasing Plan (CSPP).** The overall plan for safety and phasing of a construction project developed by the airport operator or developed by the airport operator's consultant and approved by the airport operator. It is included in the invitation for bids and becomes part of the project specifications.
- 10-19 Drainage System.** The system of pipes, ditches, and structures by which surface or subsurface waters are collected and conducted from the airport area.
- 10-20 Architect/Engineer.** The individual, partnership, firm, or corporation duly authorized by the Owner to be responsible for architectural or engineering inspection of the contract work and acting directly or through an authorized representative. The Architect/Engineer shall be understood to be the A/E of the Owner or the Owner's duly authorized representative. Engineer and Architect are used throughout the contract documents and technical specifications, and the two agents are interchangeable with regard to responsibilities.
- 10-21 Equipment.** All machinery, together with the necessary supplies for upkeep and maintenance, and also all tools and apparatus necessary for the proper construction and acceptable completion of the work.
- 10-22 Extra Work.** An item of work not provided for in the awarded contract as previously modified by change order or supplemental agreement, but which is found by the Architect/Engineer to be necessary to complete the work within the intended scope of the contract as previously modified.
- 10-23 FAA.** The Federal Aviation Administration of the U.S. Department of Transportation. When used to designate a person, FAA shall mean the Administrator or his or her duly authorized representative.

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- 10-24 Federal Specifications.** The Federal Specifications and Standards, Commercial Item Descriptions, and supplements, amendments, and indices thereto are prepared and issued by the General Services Administration of the Federal Government.
- 10-25 Force account.** Force account work is planning, engineering, or construction work done by the Sponsor's employees.
- 10-26 Inspector (also known as) "Project Representative".** An authorized representative of the Architect/Engineer assigned to make all necessary observations of tests of the work performed or being performed, or of the materials furnished or being furnished by the Contractor.
- 10-27 Intention of Terms.** Whenever, in these specifications or on the plans, the words "directed," "required," "permitted," "ordered," "designated," "prescribed," or words of like import are used, it shall be understood that the direction, requirement, permission, order, designation, or prescription of the Architect/Engineer is intended; and similarly, the words "approved," "acceptable," "satisfactory," or words of like import, shall mean approved by, or acceptable to, or satisfactory to the Architect/Engineer, subject in each case to the final determination of the OWNER.
- Any reference to a specific requirement of a numbered paragraph of the contract specifications or a cited standard shall be interpreted to include all general requirements of the entire section, specification item, or cited standard that may be pertinent to such specific reference.
- 10-28 Laboratory.** The official testing laboratories of the OWNER or such other laboratories as may be designated by the Architect/Engineer. Also referred to as "Architect/Engineer's Laboratory" or "quality assurance laboratory."
- 10-29 Lighting.** A system of fixtures providing or controlling the light sources used on or near the airport or within the airport buildings. The field lighting includes all luminous signals, markers, floodlights, and illuminating devices used on or near the airport or to aid in the operation of aircraft landing at, taking off from, or taxiing on the airport surface.
- 10-30 Major and Minor Contract Items.** A major contract item shall be any item ~~that is listed in the proposal~~, the total cost of which is equal to or greater than 20% of the total amount of the awarded contract. All other items shall be considered minor contract items.
- 10-31 Materials.** Any substance specified for use in the construction of the contract work.

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- 10-32 Notice to Proceed (NTP).** A written notice to the Contractor to begin the actual contract work on a previously agreed to date. If applicable, the Notice to Proceed shall state the date on which the contract time begins.
- 10-33 Owner.** The term “OWNER” shall mean the party of the first part or the contracting agency signatory (City of Fayetteville NC) to the contract. Where the term “OWNER” is capitalized in this document, it shall mean airport Sponsor only.
- 10-34 Passenger Facility Charge (PFC).** Per 14 CFR Part 158 and 49 USC § 40117, a PFC is a charge imposed by a public agency on passengers enplaned at a commercial service airport it controls.”
- 10-35 Pavement.** The combined surface course, base course, and subbase course, if any, considered as a single unit.
- 10-36 Payment Bond.** The approved form of security furnished by the Contractor and his or her surety as a guaranty that the Contractor will pay in full all bills and accounts for materials and labor used in the construction of the work.
- 10-37 Performance Bond.** The approved form of security furnished by the Contractor and his or her surety as a guaranty that the Contractor will complete the work in accordance with the terms of the contract.
- 10-38 Plans.** The official drawings or exact reproductions which show the location, character, dimensions and details of the airport and the work to be done and which are to be considered as a part of the contract, supplementary to the specifications.
- 10-39 Project.** The agreed scope of work for accomplishing specific airport development with respect to a particular airport.
- 10-40 Proposal.** The written offer of the bidder (when submitted on the approved proposal form) to perform the contemplated work and furnish the necessary materials in accordance with the provisions of the plans and specifications.
- 10-41 Proposal Guaranty.** The security furnished with a proposal to guarantee that the bidder will enter into a contract if his or her proposal is accepted by the OWNER.
- 10-42 Runway.** The area on the airport prepared for the landing and takeoff of aircraft.
- 10-42A Quality Control.** Details the methods and procedures that will be taken to assure that all materials and completed construction required by this contract conform to contract plans, technical specifications and other requirements, whether manufactured by the Contractor, or procured from subcontractors or

Addendum 2

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vendors. **The quality control requirements shall be provided solely by the Contractor, at no additional cost to the Owner, as contained Section 100 and elsewhere in the contract technical specifications and are in addition to and separate from the acceptance testing requirements.** The Quality Control testing program shall include fees and labor necessary to comply with any and all Special Inspections required by the respective agencies..

Quality Control testing shall be performed by the Contractor, in conformance with the specifications, in all situations for all applicable materials. A third party independent testing laboratory shall be hired by the Contractor and used for implementation of all the Quality Control Program. All Quality Control testing results shall be submitted to the Architect/Engineer within 24 hours of the testing completion as a formal submittal.

Acceptance testing requirements are the responsibility of the Owner, however the Owner reserves the right to use the Contractor's Quality Control testing for acceptance testing

10-42B Quality Assurance. Elective Owner's validation and assurance of contractor provided quality control testing program.

10-43 Specifications. A part of the contract containing the written directions and requirements for completing the contract work. Standards for specifying materials or testing which are cited in the contract specifications by reference shall have the same force and effect as if included in the contract physically.

10-44 Sponsor. A Sponsor is defined in 49 USC § 47102(24) as a public agency that submits to the FAA for an AIP grant; or a private Owner of a public-use airport that submits to the FAA an application for an AIP grant for the airport.

10-45 Structures. Airport facilities such as bridges; culverts; catch basins, inlets, retaining walls, cribbing; storm and sanitary sewer lines; water lines; underdrains; electrical ducts, manholes, handholes, lighting fixtures and bases; transformers; flexible and rigid pavements; navigational aids; buildings; vaults; and, other manmade features of the airport that may be encountered in the work and not otherwise classified herein.

10-46 Subgrade. The soil that forms the pavement foundation.

10-47 Superintendent. The Contractor's executive representative who is present on the work during progress, authorized to receive and fulfill instructions from the Architect/Engineer, and who shall supervise and direct the construction. ***The Contractor shall have a project superintendent on the job site at all times whenever any work is being performed including subcontractor work activities.***

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- 10-48 Supplemental Agreement.** A written agreement between the Contractor and the OWNER covering (1) work that would increase or decrease the total amount of the awarded contract, or any major contract item, by more than 25%, such increased or decreased work being within the scope of the originally awarded contract; or (2) work that is not within the scope of the originally awarded contract.
- 10-49 Surety.** The corporation, partnership, or individual, other than the Contractor, executing payment or performance bonds that are furnished to the OWNER by the Contractor.
- 10-50 Taxiway.** For the purpose of this document, the term taxiway means the portion of the air operations area of an airport that has been designated by competent airport authority for movement of aircraft to and from the airport's runways, aircraft parking areas, and terminal areas.
- 10-51 Work.** The furnishing of all labor, materials, tools, equipment, and incidentals necessary or convenient to the Contractor's performance of all duties and obligations imposed by the contract, plans, and specifications.
- 10-52 Working Day. Deleted.** ~~A working day shall be any day other than a legal holiday, Saturday, or Sunday on which the normal working forces of the Contractor may proceed with regular work for at least six (6) hours toward completion of the contract. When work is suspended for causes beyond the Contractor's control, it will not be counted as a working day. Saturdays, Sundays and holidays on which the Contractor's forces engage in regular work will be considered as working days.~~

END OF SECTION 10

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SECTION 20

PROPOSAL REQUIREMENTS AND CONDITIONS

20-01 Advertisement (Notice to Bidders). See Appendix A.

20-02 Qualification of Bidders. *Each bidder shall have been prequalified by the City of Fayetteville for bidding on this project.* ~~Each bidder shall furnish the OWNER satisfactory evidence of his or her competency to perform the proposed work. Such evidence of competency, unless otherwise specified, shall consist of statements covering the bidder's past experience on similar work, a list of equipment that would be available for the work, and a list of key personnel that would be available. In addition, each bidder shall furnish the OWNER satisfactory evidence of his or her financial responsibility. Such evidence of financial responsibility, unless otherwise specified, shall consist of a confidential statement or report of the bidder's financial resources and liabilities as of the last calendar year or the bidder's last fiscal year. Such statements or reports shall be certified by a public accountant. At the time of submitting such financial statements or reports, the bidder shall further certify whether his or her financial responsibility is approximately the same as stated or reported by the public accountant. If the bidder's financial responsibility has changed, the bidder shall qualify the public accountant's statement or report to reflect the bidder's true financial condition at the time such qualified statement or report is submitted to the OWNER.~~

~~Unless otherwise specified, a bidder may submit evidence that he or she is prequalified with the State Highway Division and is on the current "bidder's list" of the state in which the proposed work is located. Such evidence of State Highway Division prequalification may be submitted as evidence of financial responsibility in lieu of the certified statements or reports specified above.~~

~~Each bidder shall submit "evidence of competency" and "evidence of financial responsibility" to the OWNER at the time of bid opening.~~

20-03 Contents of Proposal Forms. The OWNER shall furnish bidders with proposal forms. All papers bound with or attached to the proposal forms are necessary parts and must not be detached.

The plans, specifications, and other documents designated in the proposal form shall be considered a part of the proposal whether attached or not.

20-04 Issuance of Proposal Forms. The OWNER reserves the right to refuse to issue a proposal form to a prospective bidder should such bidder be in default for any of the following reasons:

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- a. Failure to comply with any prequalification regulations of the OWNER, if such regulations are cited, or otherwise included, in the proposal as a requirement for bidding.
- b. Failure to pay, or satisfactorily settle, all bills due for labor and materials on former contracts in force with the OWNER at the time the OWNER issues the proposal to a prospective bidder.
- c. Documented record of Contractor default under previous contracts with the OWNER.
- d. Documented record of unsatisfactory work on previous contracts with the OWNER.

20-05 Interpretation of Estimated Proposal Quantities. *Deleted.* *Project is bidding in lump sum format. An estimate of quantities of work to be done and materials to be furnished under these specifications is given in the proposal. It is the result of careful calculations and is believed to be correct. It is given only as a basis for comparison of proposals and the award of the contract. The OWNER does not expressly, or by implication, agree that the actual quantities involved will correspond exactly therewith; nor shall the bidder plead misunderstanding or deception because of such estimates of quantities, or of the character, location, or other conditions pertaining to the work. Payment to the Contractor will be made only for the actual quantities of work performed or materials furnished in accordance with the plans and specifications. It is understood that the quantities may be increased or decreased as hereinafter provided in the subsection 40-02 titled ALTERATION OF WORK AND QUANTITIES of Section 40 without in any way invalidating the unit bidprices.*

20-06 Examination of Plans, Specifications, and Site. The bidder is expected to carefully examine the site of the proposed work, the proposal, plans, specifications, and contract forms. Bidders shall satisfy themselves as to the character, quality, and quantities of work to be performed, materials to be furnished, and as to the requirements of the proposed contract. The submission of a proposal shall be prima facie evidence that the bidder has made such examination and is satisfied as to the conditions to be encountered in performing the work and as to the requirements of the proposed contract, plans, and specifications.

Boring logs and other records of subsurface investigations and tests are available for inspection of bidders. It is understood and agreed that such subsurface information, whether included in the plans, specifications, or otherwise made available to the bidder, was obtained and is intended for the OWNER's design and estimating purposes only. Such information has been made available for the convenience of all bidders. It is further understood and

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agreed that each bidder is solely responsible for all assumptions, deductions, or conclusions which the bidder may make or obtain from his or her examination of the boring logs and other records of subsurface investigations and tests that are furnished by the OWNER.

- 20-07 Preparation of Proposal.** The bidder shall submit his or her proposal on the forms furnished by the OWNER. All blank spaces in the proposal forms must be correctly filled in where indicated for each and every item ~~for which a quantity is given~~. The bidder shall state the price (written in ink or typed) both in words and numerals for which they propose to do for each pay item furnished in the proposal. In case of conflict between words and numerals, the words, unless obviously incorrect, shall govern.

The bidder shall sign the proposal correctly and in ink. If the proposal is made by an individual, his or her name and post office address must be shown. If made by a partnership, the name and post office address of each member of the partnership must be shown. If made by a corporation, the person signing the proposal shall give the name of the state under the laws of which the corporation was chartered and the name, titles, and business address of the president, secretary, and the treasurer. Anyone signing a proposal as an agent shall file evidence of his or her authority to do so and that the signature is binding upon the firm or corporation.

- 20-08 Responsive and Responsible Bidder.** A responsive bid conforms to all significant terms and conditions contained in the Sponsor's invitation for bid. It is the Sponsor's responsibility to decide if the exceptions taken by a bidder to the solicitation are material or not and the extent of deviation it is willing to accept.

A responsible bidder has the ability to perform successfully under the terms and conditions of a proposed procurement, as defined in 49 CFR § 18.36(b)(8). This includes such matters as Contractor integrity, compliance with public policy, record of past performance, and financial and technical resources.

- 20-09 Irregular Proposals.** Proposals shall be considered irregular for the following reasons:

- a. If the proposal is on a form other than that furnished by the OWNER, or if the OWNER's form is altered, or if any part of the proposal form is detached.
- b. If there are unauthorized additions, conditional or alternate pay items, or irregularities of any kind that make the proposal incomplete, indefinite, or otherwise ambiguous.
- c. If the proposal does not contain a unit price for each pay item listed in the

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~~proposal, except in the case of authorized alternate pay items, for which the bidder is not required to furnish a unit price.~~

- d. If the proposal contains unit prices that are obviously unbalanced.
- e. If the proposal is not accompanied by the proposal guaranty specified by the OWNER.

The OWNER reserves the right to reject any irregular proposal and the right to waive technicalities if such waiver is in the best interest of the OWNER and conforms to local laws and ordinances pertaining to the letting of construction contracts.

20-10 Bid Guarantee. Each separate proposal shall be accompanied by a certified check, or other specified acceptable collateral, in the amount specified in the proposal form. Such check, or collateral, shall be made payable to the OWNER.

20-11 Delivery of Proposal. Each proposal submitted shall be placed in a sealed envelope plainly marked with the project number, location of airport, and name and business address of the bidder on the outside. When sent by mail, preferably registered, the sealed proposal, marked as indicated above, should be enclosed in an additional envelope. No proposal will be considered unless received at the place specified in the advertisement or as modified by Addendum before the time specified for opening all bids. Proposals received after the bid opening time shall be returned to the bidder unopened.

20-12 Withdrawal or Revision of Proposals. A bidder may withdraw or revise (by withdrawal of one proposal and submission of another) a proposal provided that the bidder's request for withdrawal is received by the OWNER in writing or by fax or email before the time specified for opening bids. Revised proposals must be received at the place specified in the advertisement before the time specified for opening all bids.

20-13 Public Opening of Proposals. Proposals shall be opened, and read, publicly at the time and place specified in the advertisement. Bidders, their authorized agents, and other interested persons are invited to attend. Proposals that have been withdrawn (by written or telegraphic request) or received after the time specified for opening bids shall be returned to the bidder unopened.

20-14 Disqualification of Bidders. A bidder shall be considered disqualified for any of the following reasons:

- a. Submitting more than one proposal from the same partnership, firm, or corporation under the same or different name.

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- b.** Evidence of collusion among bidders. Bidders participating in such collusion shall be disqualified as bidders for any future work of the OWNER until any such participating bidder has been reinstated by the OWNER as a qualified bidder.
- c.** If the bidder is considered to be in “default” for any reason specified in the subsection 20-04 titled ISSUANCE OF PROPOSAL FORMS of this section.

END OF SECTION 20

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SECTION 30

AWARD AND EXECUTION OF CONTRACT

30-01 Consideration of Proposals. After the proposals are publicly opened and read, they will be compared on the basis of the *lump sum base bid* summation of the products obtained by multiplying the estimated quantities shown in the proposal by the unit bid prices. If a bidder's proposal contains a discrepancy between unit bid prices written in words and unit bid prices written in numbers, the unit price written in words shall govern.

Until the award of a contract is made, the OWNER reserves the right to reject a bidder's proposal for any of the following reasons:

- a. If the proposal is irregular as specified in the subsection 20-09 titled IRREGULAR PROPOSALS of Section 20.
- b. If the bidder is disqualified for any of the reasons specified in the subsection 20-14 titled DISQUALIFICATION OF BIDDERS of Section 20.

In addition, until the award of a contract is made, the OWNER reserves the right to reject any or all proposals, waive technicalities, if such waiver is in the best interest of the OWNER and is in conformance with applicable state and local laws or regulations pertaining to the letting of construction contracts; advertise for new proposals; or proceed with the work otherwise. All such actions shall promote the OWNER's best interests.

30-02 Award of Contract. The award of a contract, if it is to be awarded, shall be made within 120 calendar days of the date specified for publicly opening proposals, unless otherwise specified herein.

Award of the contract shall be made by the OWNER to the lowest, qualified bidder whose proposal conforms to the cited requirements of the OWNER.

30-03 Cancellation of Award. The OWNER reserves the right to cancel the award without liability to the bidder, except return of proposal guaranty, at any time before a contract has been fully executed by all parties and is approved by the OWNER in accordance with the subsection 30-07 titled APPROVAL OF CONTRACT of this section.

30-04 Return of Proposal Guaranty. All proposal guaranties, except those of the two lowest bidders, will be returned immediately after the OWNER has made a comparison of bids as specified in the subsection 30-01 titled CONSIDERATION OF PROPOSALS of this section. Proposal guaranties of the two lowest bidders will be retained by the OWNER until such time as an award

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is made, at which time, the unsuccessful bidder's proposal guaranty will be returned. The successful bidder's proposal guaranty will be returned as soon as the OWNER receives the contract bonds as specified in the subsection 30-05 titled REQUIREMENTS OF CONTRACT BONDS of this section.

- 30-05 Requirements of Contract Bonds.** At the time of the execution of the contract, the successful bidder shall furnish the OWNER a surety bond or bonds that have been fully executed by the bidder and the surety guaranteeing the performance of the work and the payment of all legal debts that may be incurred by reason of the Contractor's performance of the work. The surety and the form of the bond or bonds shall be acceptable to the OWNER. Unless otherwise specified in this subsection, the surety bond or bonds shall be in a sum equal to the full amount of the contract.
- 30-06 Execution of Contract.** The successful bidder shall sign (execute) the necessary agreements for entering into the contract and return the signed contract to the OWNER, along with the fully executed surety bond or bonds specified in the subsection 30-05 titled REQUIREMENTS OF CONTRACT BONDS of this section, within 15 calendar days from the date mailed or otherwise delivered to the successful bidder.
- 30-07 Approval of Contract.** Upon receipt of the contract and contract bond or bonds that have been executed by the successful bidder, the OWNER shall complete the execution of the contract in accordance with local laws or ordinances, and return the fully executed contract to the Contractor. Delivery of the fully executed contract to the Contractor shall constitute the OWNER's approval to be bound by the successful bidder's proposal and the terms of the contract.
- 30-08 Failure to Execute Contract.** Failure of the successful bidder to execute the contract and furnish an acceptable surety bond or bonds within the 15 calendar day period specified in the subsection 30-06 titled EXECUTION OF CONTRACT of this section shall be just cause for cancellation of the award and forfeiture of the proposal guaranty, not as a penalty, but as liquidation of damages to the OWNER.

END OF SECTION 30

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SECTION 40

SCOPE OF WORK

40-01 Intent of Contract. The intent of the contract is to provide for construction and completion, in every detail, of the work described. It is further intended that the Contractor shall furnish all labor, materials, equipment, tools, transportation, and supplies required to complete the work in accordance with the plans, specifications, and terms of the contract.

40-02 Alteration of Work and Quantities. The OWNER reserves and shall have the right to make such alterations in the work as may be necessary or desirable to complete the work originally intended in an acceptable manner. Unless otherwise specified herein, the ENGINEER shall be and is hereby authorized to make such alterations in the work as may increase or decrease the originally awarded contract ~~work quantities~~, provided that the aggregate of such alterations does not change the total contract cost or the total cost of any major contract item by more than 25% ~~(total cost being based on the unit prices and estimated quantities in the awarded contract)~~. Alterations that do not exceed the 25% limitation shall not invalidate the contract nor release the surety, and the Contractor agrees to accept payment for such alterations as if the altered work had been a part of the original contract. These alterations that are for work within the general scope of the contract shall be covered by "Change Orders" issued by the ENGINEER. Change orders for altered work shall include extensions of contract time where, in the ENGINEER's opinion, such extensions are commensurate with the amount and difficulty of added work.

Should the aggregate amount of altered work exceed the 25% limitation hereinbefore specified, such excess altered work shall be covered by supplemental agreement. If the OWNER and the Contractor are unable to agree on a unit adjustment for any contract item that requires a supplemental agreement, the OWNER reserves the right to terminate the contract with respect to the item and make other arrangements for its completion.

Supplemental agreements shall be approved by the FAA and shall include all applicable Federal contract provisions for procurement and contracting required under AIP. Supplemental agreements shall also require consent of the Contractor's surety and separate performance and payment bonds.

40-03 Omitted Items. The ENGINEER may, in the OWNER's best interest, omit from the work any contract item, except major contract items. Major contract items may be omitted by a supplemental agreement. Such omission of contract items shall not invalidate any other contract provision or requirement.

Should a contract item be omitted or otherwise ordered to be non-performed,

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the Contractor shall be paid for all work performed toward completion of such item prior to the date of the order to omit such item. Payment for work performed shall be in accordance with the subsection 90-04 titled PAYMENT FOR OMITTED ITEMS of Section 90.

40-04 Extra Work. Should acceptable completion of the contract require the Contractor to perform an item of work for which no basis of payment has been provided in the original contract or previously issued change orders or supplemental agreements, the same shall be called "Extra Work." Extra Work that is within the general scope of the contract shall be covered by written change order. Change orders for such Extra Work shall contain agreed unit prices for performing the change order work in accordance with the requirements specified in the order, and shall contain any adjustment to the contract time that, in the ENGINEER's opinion, is necessary for completion of such Extra Work.

When determined by the ENGINEER to be in the OWNER's best interest, the ENGINEER may order the Contractor to proceed with Extra Work as provided in the subsection 90-05 titled PAYMENT FOR EXTRA WORK of Section 90. Extra Work that is necessary for acceptable completion of the project, but is not within the general scope of the work covered by the original contract shall be covered by a Supplemental Agreement as defined in the subsection 10-48 titled SUPPLEMENTAL AGREEMENT of Section 10.

Any claim for payment of Extra Work that is not covered by written agreement (change order or supplemental agreement) shall be rejected by the OWNER.

40-05 Maintenance of Traffic. It is the explicit intention of the contract that the safety of aircraft, as well as the Contractor's equipment and personnel, is the most important consideration.

a. It is understood and agreed that the Contractor shall provide for the free and unobstructed movement of aircraft in the air operations areas (AOAs) of the airport with respect to his or her own operations and the operations of all subcontractors as specified in the subsection 80-04 titled LIMITATION OF OPERATIONS of Section 80. It is further understood and agreed that the Contractor shall provide for the uninterrupted operation of visual and electronic signals (including power supplies thereto) used in the guidance of aircraft while operating to, from, and upon the airport as specified in the subsection 70-15 titled CONTRACTOR'S RESPONSIBILITY FOR UTILITY SERVICE AND FACILITIES OF OTHERS in Section 70.

b. With respect to his or her own operations and the operations of all subcontractors, the Contractor shall provide marking, lighting, and other acceptable means of identifying personnel, equipment, vehicles, storage

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areas, and any work area or condition that may be hazardous to the operation of aircraft, fire-rescue equipment, or maintenance vehicles at the airport.

- c. When the contract requires the maintenance of vehicular traffic on an existing road, street, or highway during the Contractor's performance of work that is otherwise provided for in the contract, plans, and specifications, the Contractor shall keep such road, street, or highway open to all traffic and shall provide such maintenance as may be required to accommodate traffic. The Contractor shall be responsible for the repair of any damage caused by the Contractor's equipment and personnel. The Contractor shall furnish, erect, and maintain barricades, warning signs, flag person, and other traffic control devices in reasonable conformity with the Manual on Uniform Traffic Control Devices (MUTCD) (<http://mutcd.fhwa.dot.gov/>), unless otherwise specified. The Contractor shall also construct and maintain in a safe condition any temporary connections necessary for ingress to and egress from abutting property or intersecting roads, streets or highways. ~~[Unless otherwise specified herein, the Contractor will not be required to furnish snow removal for such existing road, street, or highway.]~~

40-06 Removal of Existing Structures. All existing structures encountered within the established lines, grades, or grading sections shall be removed by the Contractor, unless such existing structures are otherwise specified to be relocated, adjusted up or down, salvaged, abandoned in place, reused in the work or to remain in place. The cost of removing such existing structures shall not be measured or paid for directly, but shall be included in the ~~various contract items~~ *project lump sum price*.

Should the Contractor encounter an existing structure (above or below ground) in the work for which the disposition is not indicated on the plans, the ENGINEER shall be notified prior to disturbing such structure. The disposition of existing structures so encountered shall be immediately determined by the ENGINEER in accordance with the provisions of the contract.

Except as provided in the subsection 40-07 titled RIGHTS IN AND USE OF MATERIALS FOUND IN THE WORK of this section, it is intended that all existing materials or structures that may be encountered (within the lines, grades, or grading sections established for completion of the work) shall be used in the work as otherwise provided for in the contract and shall remain the property of the OWNER when so used in the work.

40-07 Rights In and Use of Materials Found in the Work. Should the Contractor encounter any material such as (but not restricted to) sand, stone, gravel, slag, or concrete slabs within the established lines, grades, or grading sections, the

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use of which is intended by the terms of the contract to be either embankment or waste, the Contractor may at his or her option either:

- a. Use such material in another contract item, providing such use is approved by the ENGINEER and is in conformance with the contract specifications applicable to such use; or,
- b. Remove such material from the site, upon written approval of the ENGINEER; or
- c. Use such material for the Contractor's own temporary construction on site; or,
- d. Use such material as intended by the terms of the contract.

Should the Contractor wish to exercise option a., b., or c., the Contractor shall request the ENGINEER's approval in advance of such use.

~~Should the ENGINEER approve the Contractor's request to exercise option a., b., or c., the Contractor shall be paid for the excavation or removal of such material at the applicable contract price. The Contractor shall replace, at his or her own expense, such removed or excavated material with an agreed equal volume of material that is acceptable for use in constructing embankment, backfills, or otherwise to the extent that such replacement material is needed to complete the contract work. The Contractor shall not be charged for use of such material used in the work or removed from the site.~~

~~Should the ENGINEER approve the Contractor's exercise of option a., the Contractor shall be paid, at the applicable contract price, for furnishing and installing such material in accordance with requirements of the contract item in which the material is used.~~

It is understood and agreed that the Contractor shall make no claim for delays by reason of his or her exercise of option a., b., or c.

The Contractor shall not excavate, remove, or otherwise disturb any material, structure, or part of a structure which is located outside the lines, grades, or grading sections established for the work, except where such excavation or removal is provided for in the contract, plans, or specifications.

- 40-08 Final Cleanup.** Upon completion of the work and before acceptance and final payment will be made, the Contractor shall remove from the site all machinery, equipment, surplus and discarded materials, rubbish, temporary structures, and stumps or portions of trees. The Contractor shall cut all brush and woods within the limits indicated and shall leave the site in a neat and presentable

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condition. Material cleared from the site and deposited on adjacent property will not be considered as having been disposed of satisfactorily, unless the Contractor has obtained the written permission of such property OWNER.

END OF SECTION 40

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SECTION 50

CONTROL OF WORK

- 50-01 Authority of the ENGINEER.** The ENGINEER shall decide any and all questions which may arise as to the quality and acceptability of materials furnished, work performed, and as to the manner of performance and rate of progress of the work. The ENGINEER shall decide all questions that may arise as to the interpretation of the specifications or plans relating to the work. The ENGINEER shall determine the amount and quality of the several kinds of work performed and materials furnished which are to be paid for the under contract.

The ENGINEER does not have the authority to accept pavements that do not conform to FAA specification requirements. *This contract does not include pavements intended to support aircraft loads.*

- 50-02 Conformity with Plans and Specifications.** All work and all materials furnished shall be in reasonably close conformity with the lines, grades, grading sections, cross-sections, dimensions, material requirements, and testing requirements that are specified (including specified tolerances) in the contract, plans or specifications.

If the ENGINEER finds the materials furnished, work performed, or the finished product not within reasonably close conformity with the plans and specifications but that the portion of the work affected will, in his or her opinion, result in a finished product having a level of safety, economy, durability, and workmanship acceptable to the OWNER, the ENGINEER will advise the OWNER of his or her determination that the affected work be accepted and remain in place. In this event, the ENGINEER will document the determination and recommend to the OWNER a basis of acceptance that will provide for an adjustment in the contract price for the affected portion of the work. The ENGINEER's determination and recommended contract price adjustments will be based on sound engineering judgment and such tests or retests of the affected work as are, in the ENGINEER's opinion, needed. Changes in the contract price shall be covered by contract change order or supplemental agreement as applicable.

If the ENGINEER finds the materials furnished, work performed, or the finished product are not in reasonably close conformity with the plans and specifications and have resulted in an unacceptable finished product, the affected work or materials shall be removed and replaced or otherwise corrected by and at the expense of the Contractor in accordance with the ENGINEER's written orders.

For the purpose of this subsection, the term "reasonably close conformity" shall not be construed as waiving the Contractor's responsibility to complete the work in accordance with the contract, plans, and specifications. The term shall

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not be construed as waiving the ENGINEER's responsibility to insist on strict compliance with the requirements of the contract, plans, and specifications during the Contractor's execution of the work, when, in the ENGINEER's opinion, such compliance is essential to provide an acceptable finished portion of the work.

For the purpose of this subsection, the term "reasonably close conformity" is also intended to provide the ENGINEER with the authority, after consultation with the FAA, to use sound engineering judgment in his or her determinations as to acceptance of work that is not in strict conformity, but will provide a finished product equal to or better than that intended by the requirements of the contract, plans and specifications.

The ENGINEER will not be responsible for the Contractor's means, methods, techniques, sequences, or procedures of construction or the safety precautions incident thereto.

50-03 Coordination of Contract, Plans, and Specifications. The contract, plans, specifications, and all referenced standards cited are essential parts of the contract requirements. A requirement occurring in one is as binding as though occurring in all. They are intended to be complementary and to describe and provide for a complete work. In case of discrepancy, calculated dimensions will govern over scaled dimensions; contract technical specifications shall govern over contract general provisions, plans, cited standards for materials or testing, and cited advisory circulars (ACs); contract general provisions shall govern over plans, cited standards for materials or testing, and cited ACs; plans shall govern over cited standards for materials or testing and cited ACs. If any paragraphs contained in the Special Provisions conflict with General Provisions or Technical Specifications, the Special Provisions shall govern.

From time to time, discrepancies within cited testing standards occur due to the timing of the change, edits, and/or replacement of the standards. If the Contractor discovers any apparent discrepancy within standard test methods, the Contractor shall immediately ask the ENGINEER for an interpretation and decision, and such decision shall be final.

~~LIST OF SPECIAL PROVISIONS~~

~~{ — }~~

50-04 Cooperation of Contractor. The Contractor will be supplied with five copies each of the plans and specifications. The Contractor shall have available on the work at all times one copy each of the plans and specifications. Additional copies of plans and specifications may be obtained by the Contractor for the cost of reproduction.

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The Contractor shall give constant attention to the work to facilitate the progress thereof, and shall cooperate with the ENGINEER and his or her inspectors and with other contractors in every way possible. The Contractor shall have a competent superintendent on the work at all times who is fully authorized as his or her agent on the work. The superintendent shall be capable of reading and thoroughly understanding the plans and specifications and shall receive and fulfill instructions from the ENGINEER or his or her authorized representative.

50-05 Cooperation Between Contractors. The OWNER reserves the right to contract for and perform other or additional work on or near the work covered by this contract.

When separate contracts are let within the limits of any one project, each Contractor shall conduct the work so as not to interfere with or hinder the progress of completion of the work being performed by other Contractors. Contractors working on the same project shall cooperate with each other as directed.

Each Contractor involved shall assume all liability, financial or otherwise, in connection with his or her contract and shall protect and save harmless the OWNER from any and all damages or claims that may arise because of inconvenience, delays, or loss experienced because of the presence and operations of other Contractors working within the limits of the same project.

The Contractor shall arrange his or her work and shall place and dispose of the materials being used so as not to interfere with the operations of the other Contractors within the limits of the same project. The Contractor shall join his or her work with that of the others in an acceptable manner and shall perform it in proper sequence to that of the others.

50-06 Construction Layout and Stakes. The ENGINEER shall establish horizontal and vertical control only. The Contractor must establish all layout required for the construction of the work. Such stakes and markings as the ENGINEER may set for either their own or the Contractor's guidance shall be preserved by the Contractor. In case of negligence on the part of the Contractor, or their employees, resulting in the destruction of such stakes or markings, an amount equal to the cost of replacing the same may be deducted from subsequent estimates due the Contractor at the discretion of the ENGINEER.

The Contractor will be required to furnish all lines, grades and measurements from the control points necessary for the proper execution and control of the work contracted for under these specifications.

The Contractor must give copies of survey notes to the ENGINEER for each

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area of construction and for each placement of material as specified to allow the ENGINEER to make periodic checks for conformance with plan grades, alignments and grade tolerances required by the applicable material specifications. All surveys must be provided to the ENGINEER prior to commencing work items that will cover or disturb the survey staking as set by the Contractor's surveyor. Survey(s) and notes shall be provided in the following format(s): PDF and/or AutoCad. In the case of error, on the part of the Contractor, their surveyor, employees or subcontractors, resulting in established grades, alignment or grade tolerances that do not concur with those specified or shown on the plans, the Contractor is solely responsible for correction, removal, replacement and all associated costs at no additional cost to the OWNER.

No direct payment will be made, unless otherwise specified in contract documents, for this labor, materials, or other expenses. The cost shall be included in the *lump sum* price of the bid for the various items of the Contract.

Construction Staking and Layout includes but is not limited to:

- a. Existing building structural elements and floor elevations.
- b. Building foundation, columns, walls.
- c. Storm drainage.
- d. Utilities.
- e. Site grading.
- f. Retaining walls.
- g. Pavement subgrade and base courses.
- h. Concrete pavement lanes, form lines, and grades.
- i. Curb and gutter, and sidewalks.
- j. Asphalt pavement lines and grades.
- k. Pavement markings.

- ~~a. Clearing and Grubbing perimeter staking~~
~~b. Rough Grade slope stakes at 100-foot stations~~
~~c. Drainage Swales slope stakes and flow line blue tops at 50-foot stations~~

~~Subgrade blue tops at 25-foot stations and 25-foot offset distance (maximum) for the following section locations:~~

- ~~a. Runway — minimum five (5) per station~~
~~b. Taxiways — minimum three (3) per station~~
~~c. Holding apron areas — minimum three (3) per station~~
~~d. Roadways — minimum three (3) per station~~

~~Base Course blue tops at 25-foot stations and 25-foot offset distance (maximum) for the following section locations:~~

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- ~~a. Runway — minimum five (5) per station~~
- ~~b. Taxiways — minimum three (3) per station~~
- ~~c. Holding apron areas — minimum three (3) per station~~

~~Pavement areas:~~

- ~~a. Edge of Pavement hubs and tacks (for stringline by Contractor) at 100-foot stations.~~
- ~~b. Between Lifts at 25-foot stations for the following section locations:
 - ~~(1) Runways — each paving lane width~~
 - ~~(2) Taxiways — each paving lane width~~
 - ~~(3) Holding areas — each paving lane width~~~~
- ~~c. After finish paving operations at 50-foot stations:
 - ~~(1) All paved areas — Edge of each paving lane prior to next paving lot~~~~
- ~~d. Shoulder and safety area blue tops at 50-foot stations and at all break points with maximum of 50-foot offsets.~~
- ~~e. Fence lines at 100-foot stations minimum.~~
- ~~f. Electrical and Communications System locations, lines and grades including but not limited to duct runs, connections, fixtures, signs, lights, Visual Approach Slope Indicators (VASIs), Precision Approach Path Indicators (PAPIs), Runway End Identifier Lighting (REIL), Wind Cones, Distance Markers (signs), pull boxes and manholes.~~
- ~~g. Drain lines, cut stakes and alignment on 25-foot stations, inlet and manholes.~~
- ~~h. Painting and Striping layout (pinned with 1.5 inch PK nails) marked for paint Contractor. (All nails shall be removed after painting).~~
- ~~i. Laser, or other automatic control devices, shall be checked with temporary control point or grade hub at a minimum of once per 400 feet per pass (that is, paving lane).~~

The establishment of Survey Control and/or reestablishment of survey control shall be by a State Licensed Land Surveyor.

Controls and stakes disturbed or suspect of having been disturbed shall be checked and/or reset as directed by the ENGINEER without additional cost to the OWNER.

- 50-07 Automatically Controlled Equipment.** Whenever batching or mixing plant equipment is required to be operated automatically under the contract and a breakdown or malfunction of the automatic controls occurs, the equipment may be operated manually or by other methods for a period 48 hours following the breakdown or malfunction, provided this method of operations will produce results which conform to all other requirements of the contract.

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- 50-08 Authority and Duties of Inspectors.** Inspectors shall be authorized to inspect all work done and all material furnished. Such inspection may extend to all or any part of the work and to the preparation, fabrication, or manufacture of the materials to be used. Inspectors are not authorized to revoke, alter, or waive any provision of the contract. Inspectors are not authorized to issue instructions contrary to the plans and specifications or to act as foreman for the Contractor.

Inspectors are authorized to notify the Contractor or his or her representatives of any failure of the work or materials to conform to the requirements of the contract, plans, or specifications and to reject such nonconforming materials in question until such issues can be referred to the ENGINEER for a decision.

- 50-09 Inspection of the Work.** All materials and each part or detail of the work shall be subject to inspection. The ENGINEER shall be allowed access to all parts of the work and shall be furnished with such information and assistance by the Contractor as is required to make a complete and detailed inspection.

If the ENGINEER requests it, the Contractor, at any time before acceptance of the work, shall remove or uncover such portions of the finished work as may be directed. After examination, the Contractor shall restore said portions of the work to the standard required by the specifications. Should the work thus exposed or examined prove acceptable, the uncovering, or removing, and the replacing of the covering or making good of the parts removed will be paid for as extra work; but should the work so exposed or examined prove unacceptable, the uncovering, or removing, and the replacing of the covering or making good of the parts removed will be at the Contractor's expense.

Any work done or materials used without supervision or inspection by an authorized representative of the OWNER may be ordered removed and replaced at the Contractor's expense unless the OWNER's representative failed to inspect after having been given reasonable notice in writing that the work was to be performed.

Should the contract work include relocation, adjustment, or any other modification to existing facilities, not the property of the (contract) OWNER, authorized representatives of the Owners of such facilities shall have the right to inspect such work. Such inspection shall in no sense make any facility owner a party to the contract, and shall in no way interfere with the rights of the parties to this contract.

- 50-10 Removal of Unacceptable and Unauthorized Work.** All work that does not conform to the requirements of the contract, plans, and specifications will be considered unacceptable, unless otherwise determined acceptable by the ENGINEER as provided in the subsection 50-02 titled CONFORMITY WITH PLANS AND SPECIFICATIONS of this section.

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Unacceptable work, whether the result of poor workmanship, use of defective materials, damage through carelessness, or any other cause found to exist prior to the final acceptance of the work, shall be removed immediately and replaced in an acceptable manner in accordance with the provisions of the subsection 70-14 titled CONTRACTOR'S RESPONSIBILITY FOR WORK of Section 70.

No removal work made under provision of this subsection shall be done without lines and grades having been established by the ENGINEER. Work done contrary to the instructions of the ENGINEER, work done beyond the lines shown on the plans or as established by the ENGINEER, except as herein specified, or any extra work done without authority, will be considered as unauthorized and will not be paid for under the provisions of the contract. Work so done may be ordered removed or replaced at the Contractor's expense.

Upon failure on the part of the Contractor to comply with any order of the ENGINEER made under the provisions of this subsection, the ENGINEER will have authority to cause unacceptable work to be remedied or removed and replaced and unauthorized work to be removed and to deduct the costs incurred by the OWNER from any monies due or to become due the Contractor.

50-11 Load Restrictions. The Contractor shall comply with all legal load restrictions in the hauling of materials on public roads beyond the limits of the work. A special permit will not relieve the Contractor of liability for damage that may result from the moving of material or equipment.

The operation of equipment of such weight or so loaded as to cause damage to structures or to any other type of construction will not be permitted. Hauling of materials over the base course or surface course under construction shall be limited as directed. No loads will be permitted on a concrete pavement, base, or structure before the expiration of the curing period. The Contractor shall be responsible for all damage done by his or her hauling equipment and shall correct such damage at his or her own expense.

50-12 Maintenance During Construction. The Contractor shall maintain the work during construction and until the work is accepted. Maintenance shall constitute continuous and effective work prosecuted day by day, with adequate equipment and forces so that the work is maintained in satisfactory condition at all times.

In the case of a contract for the placing of a course upon a course or subgrade previously constructed, the Contractor shall maintain the previous course or subgrade during all construction operations.

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All costs of maintenance work during construction and before the project is accepted shall be included in the ~~unit prices bid on the various contract items~~ *project lump sum price*, and the Contractor will not be paid an additional amount for such work.

50-13 Failure to Maintain the Work. Should the Contractor at any time fail to maintain the work as provided in the subsection 50-12 titled MAINTENANCE DURING CONSTRUCTION of this section, the ENGINEER shall immediately notify the Contractor of such noncompliance. Such notification shall specify a reasonable time within which the Contractor shall be required to remedy such unsatisfactory maintenance condition. The time specified will give due consideration to the exigency that exists.

Should the Contractor fail to respond to the ENGINEER's notification, the OWNER may suspend any work necessary for the OWNER to correct such unsatisfactory maintenance condition, depending on the exigency that exists. Any maintenance cost incurred by the OWNER, shall be deducted from monies due or to become due the Contractor.

50-14 Partial Acceptance. If at any time during the execution of the project the Contractor substantially completes a usable unit or portion of the work, the occupancy of which will benefit the OWNER, the Contractor may request the ENGINEER to make final inspection of that unit. If the ENGINEER finds upon inspection that the unit has been satisfactorily completed in compliance with the contract, the ENGINEER may accept it as being complete, and the Contractor may be relieved of further responsibility for that unit. Such partial acceptance and beneficial occupancy by the OWNER shall not void or alter any provision of the contract.

50-15 Final Acceptance. Upon due notice from the Contractor of presumptive completion of the entire project, the ENGINEER and OWNER will make an inspection. If all construction provided for and contemplated by the contract is found to be complete in accordance with the contract, plans, and specifications, such inspection shall constitute the final inspection. The ENGINEER shall notify the Contractor in writing of final acceptance as of the date of the final inspection.

If, however, the inspection discloses any work, in whole or in part, as being unsatisfactory, the ENGINEER will give the Contractor the necessary instructions for correction of same and the Contractor shall immediately comply with and execute such instructions. Upon correction of the work, another inspection will be made which shall constitute the final inspection, provided the work has been satisfactorily completed. In such event, the ENGINEER will make the final acceptance and notify the Contractor in writing of this acceptance as of the date of final inspection.

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50-16 Claims for Adjustment and Disputes. If for any reason the Contractor deems that additional compensation is due for work or materials not clearly provided for in the contract, plans, or specifications or previously authorized as extra work, the Contractor shall notify the ENGINEER in writing of his or her intention to claim such additional compensation before the Contractor begins the work on which the Contractor bases the claim. If such notification is not given or the ENGINEER is not afforded proper opportunity by the Contractor for keeping strict account of actual cost as required, then the Contractor hereby agrees to waive any claim for such additional compensation. Such notice by the Contractor and the fact that the ENGINEER has kept account of the cost of the work shall not in any way be construed as proving or substantiating the validity of the claim. When the work on which the claim for additional compensation is based has been completed, the Contractor shall, within 10 calendar days, submit a written claim to the ENGINEER who will present it to the OWNER for consideration in accordance with local laws or ordinances.

Nothing in this subsection shall be construed as a waiver of the Contractor's right to dispute final payment based on differences in measurements or computations.

END OF SECTION 50

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SECTION 60

CONTROL OF MATERIALS

60-01 Source of Supply and Quality Requirements. The materials used in the work shall conform to the requirements of the contract, plans, and specifications. Unless otherwise specified, such materials that are manufactured or processed shall be new (as compared to used or reprocessed).

In order to expedite the inspection and testing of materials, the Contractor shall furnish complete statements to the ENGINEER as to the origin, composition, and manufacture of all materials to be used in the work. Such statements shall be furnished promptly after execution of the contract but, in all cases, prior to delivery of such materials.

At the ENGINEER's option, materials may be approved at the source of supply before delivery is stated. If it is found after trial that sources of supply for previously approved materials do not produce specified products, the Contractor shall furnish materials from other sources.

~~The Contractor shall furnish airport lighting equipment that conforms to the requirements of cited materials specifications. In addition, where an FAA specification for airport lighting equipment is cited in the plans or specifications, the Contractor shall furnish such equipment that is:~~

- ~~a. Listed in advisory circular (AC) 150/5345-53, Airport Lighting Equipment Certification Program, and Addendum that is in effect on the date of advertisement; and,~~
- ~~b. Produced by the manufacturer as listed in the Addendum cited above for the certified equipment part number.~~

~~The following airport lighting equipment is required for this contract and is to be furnished by the Contractor in accordance with the requirements of this subsection: [].~~

60-02 Samples, Tests, and Cited Specifications. Unless otherwise designated, all materials used in the work shall be inspected, tested, and approved by the ENGINEER before incorporation in the work. Any work in which untested materials are used without approval or written permission of the ENGINEER shall be performed at the Contractor's risk. Materials found to be unacceptable and unauthorized will not be paid for and, if directed by the ENGINEER, shall be removed at the Contractor's expense.

Unless otherwise designated, quality assurance tests in accordance with the

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cited standard methods of ASTM, American Association of State Highway and Transportation Officials (AASHTO), Federal Specifications, Commercial Item Descriptions, and all other cited methods, which are current on the date of advertisement for bids, will be made by and at the expense of the ENGINEER.

The testing organizations performing on-site quality assurance field tests shall have copies of all referenced standards on the construction site for use by all technicians and other personnel, including the Contractor's representative at his or her request. Unless otherwise designated, samples for quality assurance will be taken by a qualified representative of the ENGINEER. All materials being used are subject to inspection, test, or rejection at any time prior to or during incorporation into the work. Copies of all tests will be furnished to the Contractor's representative at their request after review and approval of the ENGINEER.

The Contractor shall employ a testing organization to perform all Contractor required Quality Control tests. The Contractor shall submit to the ENGINEER resumes on all testing organizations and individual persons who will be performing the tests. The ENGINEER will determine if such persons are qualified. All the test data shall be reported to the ENGINEER after the results are known. A legible, handwritten copy of all test data shall be given to the ENGINEER daily, along with printed reports, in an approved format, on a weekly basis. After completion of the project, and prior to final payment, the Contractor shall submit a final report to the ENGINEER showing all test data reports, plus an analysis of all results showing ranges, averages, and corrective action taken on all failing tests.

60-03 Certification of Compliance. The ENGINEER may permit the use, prior to sampling and testing, of certain materials or assemblies when accompanied by manufacturer's certificates of compliance stating that such materials or assemblies fully comply with the requirements of the contract. The certificate shall be signed by the manufacturer. Each lot of such materials or assemblies delivered to the work must be accompanied by a certificate of compliance in which the lot is clearly identified.

Materials or assemblies used on the basis of certificates of compliance may be sampled and tested at any time and if found not to be in conformity with contract requirements will be subject to rejection whether in place or not.

The form and distribution of certificates of compliance shall be as approved by the ENGINEER.

When a material or assembly is specified by "brand name or equal" and the Contractor elects to furnish the specified "brand name," the Contractor shall be required to furnish the manufacturer's certificate of compliance for each lot of

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such material or assembly delivered to the work. Such certificate of compliance shall clearly identify each lot delivered and shall certify as to:

- a. Conformance to the specified performance, testing, quality or dimensional requirements; and,
- b. Suitability of the material or assembly for the use intended in the contract work.

Should the Contractor propose to furnish an “or equal” material or assembly, the Contractor shall furnish the manufacturer’s certificates of compliance as hereinbefore described for the specified brand name material or assembly. However, the ENGINEER shall be the sole judge as to whether the proposed “or equal” is suitable for use in the work.

The ENGINEER reserves the right to refuse permission for use of materials or assemblies on the basis of certificates of compliance.

60-04 Plant Inspection. The ENGINEER or his or her authorized representative may inspect, at its source, any specified material or assembly to be used in the work. Manufacturing plants may be inspected from time to time for the purpose of determining compliance with specified manufacturing methods or materials to be used in the work and to obtain samples required for acceptance of the material or assembly.

Should the ENGINEER conduct plant inspections, the following conditions shall exist:

- a. The ENGINEER shall have the cooperation and assistance of the Contractor and the producer with whom the ENGINEER has contracted for materials.
- b. The ENGINEER shall have full entry at all reasonable times to such parts of the plant that concern the manufacture or production of the materials being furnished.
- c. If required by the ENGINEER, the Contractor shall arrange for adequate office or working space that may be reasonably needed for conducting plant inspections. Office or working space should be conveniently located with respect to the plant.

It is understood and agreed that the OWNER shall have the right to retest any material that has been tested and approved at the source of supply after it has been delivered to the site. The ENGINEER shall have the right to reject only material which, when retested, does not meet the requirements of the contract,

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plans, or specifications.

60-05 Engineer's Field Office. An ENGINEER's field office is not required.

60-06 Storage of Materials. Materials shall be so stored as to assure the preservation of their quality and fitness for the work. Stored materials, even though approved before storage, may again be inspected prior to their use in the work. Stored materials shall be located to facilitate their prompt inspection. The Contractor shall coordinate the storage of all materials with the ENGINEER. Materials to be stored on airport property shall not create an obstruction to air navigation nor shall they interfere with the free and unobstructed movement of aircraft. Unless otherwise shown on the plans, the storage of materials and the location of the Contractor's plant and parked equipment or vehicles shall be as directed by the ENGINEER. Private property shall not be used for storage purposes without written permission of the owner or lessee of such property. The Contractor shall make all arrangements and bear all expenses for the storage of materials on private property. Upon request, the Contractor shall furnish the ENGINEER a copy of the property owner's permission.

All storage sites on private or airport property shall be restored to their original condition by the Contractor at his or her entire expense, except as otherwise agreed to (in writing) by the owner or lessee of the property.

60-07 Unacceptable Materials. Any material or assembly that does not conform to the requirements of the contract, plans, or specifications shall be considered unacceptable and shall be rejected. The Contractor shall remove any rejected material or assembly from the site of the work, unless otherwise instructed by the ENGINEER.

Rejected material or assembly, the defects of which have been corrected by the Contractor, shall not be returned to the site of the work until such time as the ENGINEER has approved its use in the work.

60-08 Owner Furnished Materials. The Contractor shall furnish all materials required to complete the work, except those specified, if any, to be furnished by the OWNER. OWNER-furnished materials shall be made available to the Contractor at the location specified.

All costs of handling, transportation from the specified location to the site of work, storage, and installing OWNER-furnished materials shall be included in the unit price bid for the contract item in which such OWNER-furnished material is used *project lump sum price*.

After any OWNER-furnished material has been delivered to the location

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specified, the Contractor shall be responsible for any demurrage, damage, loss, or other deficiencies that may occur during the Contractor's handling, storage, or use of such OWNER-furnished material. The OWNER will deduct from any monies due or to become due the Contractor any cost incurred by the OWNER in making good such loss due to the Contractor's handling, storage, or use of OWNER-furnished materials.

END OF SECTION 60

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SECTION 70

LEGAL REGULATIONS AND RESPONSIBILITY TO PUBLIC

- 70-01 Laws to be Observed.** The Contractor shall keep fully informed of all Federal and state laws, all local laws, ordinances, and regulations and all orders and decrees of bodies or tribunals having any jurisdiction or authority, which in any manner affect those engaged or employed on the work, or which in any way affect the conduct of the work. The Contractor shall at all times observe and comply with all such laws, ordinances, regulations, orders, and decrees; and shall protect and indemnify the OWNER and all his or her officers, agents, or servants against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order, or decree, whether by the Contractor or the Contractor's employees.
- 70-02 Permits, Licenses, and Taxes.** The Contractor shall procure all permits and licenses, pay all charges, fees, and taxes, and give all notices necessary and incidental to the due and lawful execution of the work.
- 70-03 Patented Devices, Materials, and Processes.** If the Contractor is required or desires to use any design, device, material, or process covered by letters of patent or copyright, the Contractor shall provide for such use by suitable legal agreement with the Patentee or owner. The Contractor and the surety shall indemnify and hold harmless the OWNER, any third party, or political subdivision from any and all claims for infringement by reason of the use of any such patented design, device, material or process, or any trademark or copyright, and shall indemnify the OWNER for any costs, expenses, and damages which it may be obliged to pay by reason of an infringement, at any time during the execution or after the completion of the work.
- 70-04 Restoration of Surfaces Disturbed by Others.** The OWNER reserves the right to authorize the construction, reconstruction, or maintenance of any public or private utility service, FAA or National Oceanic and Atmospheric Administration (NOAA) facility, or a utility service of another government agency at any time during the progress of the work. To the extent that such construction, reconstruction, or maintenance has been coordinated with the OWNER, such authorized work (by others) is indicated as follows:

Fayetteville PWC: Electrical and Fiber Optic

Time Warner Cable: Service Lines

CenturyLink: Copper and Fiber Optic Service Lines

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City IT: Fiber Optic and Copper Cables

Fayetteville PWC: Water and Sewer

Except as listed above, the Contractor shall not permit any individual, firm, or corporation to excavate or otherwise disturb such utility services or facilities located within the limits of the work without the written permission of the ENGINEER.

Should the owner of public or private utility service, FAA, or NOAA facility, or a utility service of another government agency be authorized to construct, reconstruct, or maintain such utility service or facility during the progress of the work, the Contractor shall cooperate with such owners by arranging and performing the work in this contract to facilitate such construction, reconstruction or maintenance by others whether or not such work by others is listed above. When ordered as extra work by the ENGINEER, the Contractor shall make all necessary repairs to the work which are due to such authorized work by others, unless otherwise provided for in the contract, plans, or specifications. It is understood and agreed that the Contractor shall not be entitled to make any claim for damages due to such authorized work by others or for any delay to the work resulting from such authorized work.

70-05 Federal Aid Participation. For Airport Improvement Program (AIP) contracts, the United States Government has agreed to reimburse the OWNER for some portion of the contract costs. Such reimbursement is made from time to time upon the OWNER's request to the FAA. In consideration of the United States Government's (FAA's) agreement with the OWNER, the OWNER has included provisions in this contract pursuant to the requirements of Title 49 of the USC and the Rules and Regulations of the FAA that pertain to the work.

As required by the USC, the contract work is subject to the inspection and approval of duly authorized representatives of the FAA Administrator, and is further subject to those provisions of the rules and regulations that are cited in the contract, plans, or specifications.

No requirement of the USC, the rules and regulations implementing the USC, or this contract shall be construed as making the Federal Government a party to the contract nor will any such requirement interfere, in any way, with the rights of either party to the contract.

70-06 Sanitary, Health, and Safety Provisions. The Contractor shall provide and maintain in a neat, sanitary condition such accommodations for the use of his or her employees as may be necessary to comply with the requirements of the state and local Board of Health, or of other bodies or tribunals having jurisdiction.

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Attention is directed to Federal, state, and local laws, rules and regulations concerning construction safety and health standards. The Contractor shall not require any worker to work in surroundings or under conditions that are unsanitary, hazardous, or dangerous to his or her health or safety.

70-07 Public Convenience and Safety. The Contractor shall control his or her operations and those of his or her subcontractors and all suppliers, to assure the least inconvenience to the traveling public. Under all circumstances, safety shall be the most important consideration.

The Contractor shall maintain the free and unobstructed movement of aircraft and vehicular traffic with respect to his or her own operations and those of his or her subcontractors and all suppliers in accordance with the subsection 40-05 titled MAINTENANCE OF TRAFFIC of Section 40 hereinbefore specified and shall limit such operations for the convenience and safety of the traveling public as specified in the subsection 80-04 titled LIMITATION OF OPERATIONS of Section 80 hereinafter.

70-08 Barricades, Warning Signs, and Hazard Markings. The Contractor shall furnish, erect, and maintain all barricades, warning signs, and markings for hazards necessary to protect the public and the work. When used during periods of darkness, such barricades, warning signs, and hazard markings shall be suitably illuminated. Unless otherwise specified, barricades, warning signs, and markings for hazards that are in the air operations area (AOAs) shall be a maximum of 18 inches high. Unless otherwise specified, barricades shall be spaced not more than 4 feet apart. Barricades, warning signs, and markings shall be paid for under subsection 40-05.

For vehicular and pedestrian traffic, the Contractor shall furnish, erect, and maintain barricades, warning signs, lights and other traffic control devices in reasonable conformity with the Manual on Uniform Traffic Control Devices.

When the work requires closing an air operations area of the airport or portion of such area, the Contractor shall furnish, erect, and maintain temporary markings and associated lighting conforming to the requirements of advisory circular (AC) 150/5340-1L, Standards for Airport Markings.

The Contractor shall furnish, erect, and maintain markings and associated lighting of open trenches, excavations, temporary stock piles, and the Contractor's parked construction equipment that may be hazardous to the operation of emergency fire-rescue or maintenance vehicles on the airport in reasonable conformance to AC 150/5370-2F, Operational Safety on Airports During Construction.

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The Contractor shall identify each motorized vehicle or piece of construction equipment in reasonable conformance to AC 150/5370-2F.

The Contractor shall furnish and erect all barricades, warning signs, and markings for hazards prior to commencing work that requires such erection and shall maintain the barricades, warning signs, and markings for hazards until their removal is directed by the ENGINEER.

Open-flame type lights shall not be permitted.

70-09 Use of Explosives. ~~Use of explosives is not authorized. When the use of explosives is necessary for the execution of the work, the Contractor shall exercise the utmost care not to endanger life or property, including new work. The Contractor shall be responsible for all damage resulting from the use of explosives.~~

~~All explosives shall be stored in a secure manner in compliance with all laws and ordinances, and all such storage places shall be clearly marked. Where no local laws or ordinances apply, storage shall be provided satisfactory to the ENGINEER and, in general, not closer than 1,000 feet from the work or from any building, road, or other place of human occupancy.~~

~~The Contractor shall notify each property owner and public utility company having structures or facilities in proximity to the site of the work of his or her intention to use explosives. Such notice shall be given sufficiently in advance to enable them to take such steps as they may deem necessary to protect their property from injury.~~

~~The use of electrical blasting caps shall not be permitted on or within 1,000 feet of the airport property.~~

70-10 Protection and Restoration of Property and Landscape. The Contractor shall be responsible for the preservation of all public and private property, and shall protect carefully from disturbance or damage all land monuments and property markers until the ENGINEER has witnessed or otherwise referenced their location and shall not move them until directed.

The Contractor shall be responsible for all damage or injury to property of any character, during the execution of the work, resulting from any act, omission, neglect, or misconduct in manner or method of executing the work, or at any time due to defective work or materials, and said responsibility shall not be released until the project has been completed and accepted.

When or where any direct or indirect damage or injury is done to public or private property by or on account of any act, omission, neglect, or misconduct

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in the execution of the work, or in consequence of the non-execution thereof by the Contractor, the Contractor shall restore, at his or her own expense, such property to a condition similar or equal to that existing before such damage or injury was done, by repairing, or otherwise restoring as may be directed, or the Contractor shall make good such damage or injury in an acceptable manner.

70-11 Responsibility for Damage Claims. The Contractor shall indemnify and save harmless the ENGINEER and the OWNER and their officers, and employees from all suits, actions, or claims, of any character, brought because of any injuries or damage received or sustained by any person, persons, or property on account of the operations of the Contractor; or on account of or in consequence of any neglect in safeguarding the work; or through use of unacceptable materials in constructing the work; or because of any act or omission, neglect, or misconduct of said Contractor; or because of any claims or amounts recovered from any infringements of patent, trademark, or copyright; or from any claims or amounts arising or recovered under the "Workmen's Compensation Act," or any other law, ordinance, order, or decree. Money due the Contractor under and by virtue of his or her contract considered necessary by the OWNER for such purpose may be retained for the use of the OWNER or, in case no money is due, his or her surety may be held until such suits, actions, or claims for injuries or damages shall have been settled and suitable evidence to that effect furnished to the OWNER, except that money due the Contractor will not be withheld when the Contractor produces satisfactory evidence that he or she is adequately protected by public liability and property damage insurance.

70-12 Third Party Beneficiary Clause. It is specifically agreed between the parties executing the contract that it is not intended by any of the provisions of any part of the contract to create for the public or any member thereof, a third party beneficiary or to authorize anyone not a party to the contract to maintain a suit for personal injuries or property damage pursuant to the terms or provisions of the contract.

70-13 Opening Sections of the Work to Traffic. Should it be necessary for the Contractor to complete portions of the contract work for the beneficial occupancy of the OWNER prior to completion of the entire contract, such "phasing" of the work shall be specified herein and indicated on the plans. When so specified, the Contractor shall complete such portions of the work on or before the date specified or as otherwise specified. The Contractor shall make his or her own estimate of the difficulties involved in arranging the work to permit such beneficial occupancy by the OWNER as described below:

Refer to Phasing Plans and Diagrams

Upon completion of any portion of the work listed above, such portion shall be

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accepted by the OWNER in accordance with the subsection 50-14 titled PARTIAL ACCEPTANCE of Section 50.

No portion of the work may be opened by the Contractor for public use until ordered by the ENGINEER in writing. Should it become necessary to open a portion of the work to public traffic on a temporary or intermittent basis, such openings shall be made when, in the opinion of the ENGINEER, such portion of the work is in an acceptable condition to support the intended traffic. Temporary or intermittent openings are considered to be inherent in the work and shall not constitute either acceptance of the portion of the work so opened or a waiver of any provision of the contract. Any damage to the portion of the work so opened that is not attributable to traffic which is permitted by the OWNER shall be repaired by the Contractor at his or her expense.

The Contractor shall make his or her own estimate of the inherent difficulties involved in completing the work under the conditions herein described and shall not claim any added compensation by reason of delay or increased cost due to opening a portion of the contract work.

Contractor shall be required to conform to safety standards contained AC 150/5370-2F (see Special Provisions).

Contractor shall refer to the approved Construction Safety Phasing Plan (CSPP) to identify barricade requirements and other safety requirements prior to opening up sections of work to traffic.

70-14 Contractor's Responsibility for Work. Until the ENGINEER's final written acceptance of the entire completed work, excepting only those portions of the work accepted in accordance with the subsection 50-14 titled PARTIAL ACCEPTANCE of Section 50, the Contractor shall have the charge and care thereof and shall take every precaution against injury or damage to any part due to the action of the elements or from any other cause, whether arising from the execution or from the non-execution of the work. The Contractor shall rebuild, repair, restore, and make good all injuries or damages to any portion of the work occasioned by any of the above causes before final acceptance and shall bear the expense thereof except damage to the work due to unforeseeable causes beyond the control of and without the fault or negligence of the Contractor, including but not restricted to acts of God such as earthquake, tidal wave, tornado, hurricane or other cataclysmic phenomenon of nature, or acts of the public enemy or of government authorities.

If the work is suspended for any cause whatever, the Contractor shall be responsible for the work and shall take such precautions necessary to prevent damage to the work. The Contractor shall provide for normal drainage and shall erect necessary temporary structures, signs, or other facilities at his or her

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expense. During such period of suspension of work, the Contractor shall properly and continuously maintain in an acceptable growing condition all living material in newly established planting, seeding, and sodding furnished under the contract, and shall take adequate precautions to protect new tree growth and other important vegetative growth against injury.

70-15 Contractor's Responsibility for Utility Service and Facilities of Others. As provided in the subsection 70-04 titled RESTORATION OF SURFACES DISTURBED BY OTHERS of this section, the Contractor shall cooperate with the owner of any public or private utility service, FAA or NOAA, or a utility service of another government agency that may be authorized by the owner to construct, reconstruct or maintain such utility services or facilities during the progress of the work. In addition, the Contractor shall control their operations to prevent the unscheduled interruption of such utility services and facilities.

To the extent that such public or private utility services, FAA, or NOAA facilities, or utility services of another governmental agency are known to exist within the limits of the contract work, the approximate locations have been indicated on the plans and the owners are indicated as follows:

Fayetteville PWC:	Electrical and Fiber Optic
Time Warner Cable:	Service Lines
CenturyLink:	Copper and Fiber Optic Service Lines
City IT:	Fiber Optic and Copper Cables
Fayetteville PWC:	Water and Sewer
Piedmont Natural Gas:	Natural Gas Lines

It is understood and agreed that the OWNER does not guarantee the accuracy or the completeness of the location information relating to existing utility services, facilities, or structures that may be shown on the plans or encountered in the work. Any inaccuracy or omission in such information shall not relieve the Contractor of the responsibility to protect such existing features from damage or unscheduled interruption of service.

It is further understood and agreed that the Contractor shall, upon execution of the contract, notify the owners of all utility services or other facilities of his or her plan of operations. Such notification shall be in writing ~~addressed to THE PERSON TO CONTACT~~ as provided in this subsection and subsection 70-04 titled RESTORATION OF SURFACES DISTURBED BY OTHERS of this section. A copy of each notification shall be given to the ENGINEER.

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In addition to the general written notification provided, it shall be the responsibility of the Contractor to keep such individual owners advised of changes in their plan of operations that would affect such owners.

Prior to beginning the work in the general vicinity of an existing utility service or facility, the Contractor shall again notify each such owner of their plan of operation. If, in the Contractor's opinion, the owner's assistance is needed to locate the utility service or facility or the presence of a representative of the owner is desirable to observe the work, such advice should be included in the notification. Such notification shall be given by the most expeditious means to reach the utility owner's PERSON TO CONTACT no later than two normal business days prior to the Contractor's commencement of operations in such general vicinity. The Contractor shall furnish a written summary of the notification to the ENGINEER.

The Contractor's failure to give the two days' notice shall be cause for the OWNER to suspend the Contractor's operations in the general vicinity of a utility service or facility.

Where the outside limits of an underground utility service have been located and staked on the ground, the Contractor shall be required to use hand excavation methods within 3 feet of such outside limits at such points as may be required to ensure protection from damage due to the Contractor's operations.

Should the Contractor damage or interrupt the operation of a utility service or facility by accident or otherwise, the Contractor shall immediately notify the proper authority and the ENGINEER and shall take all reasonable measures to prevent further damage or interruption of service. The Contractor, in such events, shall cooperate with the utility service or facility owner and the ENGINEER continuously until such damage has been repaired and service restored to the satisfaction of the utility or facility owner.

The Contractor shall bear all costs of damage and restoration of service to any utility service or facility due to their operations whether due to negligence or accident. The OWNER reserves the right to deduct such costs from any monies due or which may become due the Contractor, or his or her surety.

70-15.1 FAA Facilities and Cable Runs. The Contractor is hereby advised that the construction limits of the project include existing facilities and buried cable runs that are owned, operated and maintained by the FAA. The Contractor, during the execution of the project work, shall comply with the following:

- a. The Contractor shall permit FAA maintenance personnel the right of

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access to the project work site for purposes of inspecting and maintaining all existing FAA owned facilities.

- b. The Contractor shall provide notice to the FAA Air Traffic Organization (ATO)/Technical Operations/System Support Center (SSC) Point-of-Contact through the airport manager a minimum of seven (7) calendar days prior to commencement of construction activities in order to permit sufficient time to locate and mark existing buried cables and to schedule any required facility outages.
- c. If execution of the project work requires a facility outage, the Contractor shall contact the FAA Point-of-Contact a minimum of 72 hours prior to the time of the required outage.
- d. Any damage to FAA cables, access roads, or FAA facilities during construction caused by the Contractor's equipment or personnel whether by negligence or accident will require the Contractor to repair or replace the damaged cables, access road, or FAA facilities to FAA requirements. The Contractor shall not bear the cost to repair damage to underground facilities or utilities improperly located by the FAA.
- e. If the project work requires the cutting or splicing of FAA owned cables, the FAA Point-of-Contact shall be contacted a minimum of 72 hours prior to the time the cable work commences. The FAA reserves the right to have a FAA representative on site to observe the splicing of the cables as a condition of acceptance. All cable splices are to be accomplished in accordance with FAA specifications and require approval by the FAA Point-of-Contact as a condition of acceptance by the OWNER. The Contractor is hereby advised that FAA restricts the location of where splices may be installed. If a cable splice is required in a location that is not permitted by FAA, the Contractor shall furnish and install a sufficient length of new cable that eliminates the need for any splice.

70-16 Furnishing Rights-of-Way. The OWNER will be responsible for furnishing all rights-of-way upon which the work is to be constructed in advance of the Contractor's operations.

70-17 Personal Liability of Public Officials. In carrying out any of the contract provisions or in exercising any power or authority granted by this contract, there shall be no liability upon the ENGINEER, his or her authorized representatives, or any officials of the OWNER either personally or as an official of the OWNER. It is understood that in such matters they act solely as agents and representatives of the OWNER.

70-18 No Waiver of Legal Rights. Upon completion of the work, the OWNER will

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expeditiously make final inspection and notify the Contractor of final acceptance. Such final acceptance, however, shall not preclude or stop the OWNER from correcting any measurement, estimate, or certificate made before or after completion of the work, nor shall the OWNER be precluded or stopped from recovering from the Contractor or his or her surety, or both, such overpayment as may be sustained, or by failure on the part of the Contractor to fulfill his or her obligations under the contract. A waiver on the part of the OWNER of any breach of any part of the contract shall not be held to be a waiver of any other or subsequent breach.

The Contractor, without prejudice to the terms of the contract, shall be liable to the OWNER for latent defects, fraud, or such gross mistakes as may amount to fraud, or as regards the OWNER's rights under any warranty or guaranty.

70-19 Environmental Protection. The Contractor shall comply with all Federal, state, and local laws and regulations controlling pollution of the environment. The Contractor shall take necessary precautions to prevent pollution of streams, lakes, ponds, and reservoirs with fuels, oils, bitumens, chemicals, or other harmful materials and to prevent pollution of the atmosphere from particulate and gaseous matter.

70-20 Archaeological and Historical Findings. Unless otherwise specified in this subsection, the Contractor is advised that the site of the work is not within any property, district, or site, and does not contain any building, structure, or object listed in the current National Register of Historic Places published by the United States Department of Interior.

Should the Contractor encounter, during his or her operations, any building, part of a building, structure, or object that is incongruous with its surroundings, the Contractor shall immediately cease operations in that location and notify the ENGINEER. The ENGINEER will immediately investigate the Contractor's finding and the OWNER will direct the Contractor to either resume operations or to suspend operations as directed.

Should the OWNER order suspension of the Contractor's operations in order to protect an archaeological or historical finding, or order the Contractor to perform extra work, such shall be covered by an appropriate contract change order or supplemental agreement as provided in the subsection 40-04 titled EXTRA WORK of Section 40 and the subsection 90-05 titled PAYMENT FOR EXTRA WORK of Section 90. If appropriate, the contract change order or supplemental agreement shall include an extension of contract time in accordance with the subsection 80-07 titled DETERMINATION AND EXTENSION OF CONTRACT TIME of Section 80.

END OF SECTION 70

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SECTION 80

EXECUTION AND PROGRESS

80-01 Subletting of Contract. The OWNER will not recognize any subcontractor on the work. The Contractor shall at all times when work is in progress be represented either in person, by a qualified superintendent, or by other designated, qualified representative who is duly authorized to receive and execute orders of the Architect/Engineer.

The Contractor shall provide copies of all subcontracts to the Architect/Engineer. The Contractor shall perform, with his organization, an amount of work equal to at least 25 percent of the total contract cost.

Should the Contractor elect to assign his or her contract, said assignment shall be concurred in by the surety, shall be presented for the consideration and approval of the OWNER, and shall be consummated only on the written approval of the OWNER.

80-02 Notice to Proceed. The notice to proceed shall state the date on which it is expected the Contractor will begin the construction and from which date contract time will be charged. The Contractor shall begin the work to be performed under the contract within 10 days of the date set by the Architect/Engineer in the written notice to proceed, but in any event, the Contractor shall notify the Architect/Engineer at least 24 hours in advance of the time actual construction operations will begin. The Contractor shall not commence any actual construction prior to the date on which the notice to proceed is issued by the OWNER.

80-03 Execution and Progress. Unless otherwise specified, the Contractor shall submit their comprehensive progress schedule for the Architect/Engineer's approval **within five calendar days after the effective date of the notice to proceed.** The Contractor's progress schedule, when approved by the Architect/Engineer, may be used to establish major construction operations and to check on the progress of the work. **Time for completing all contracted work is of paramount importance to this contract.** The Contractor shall provide sufficient materials, equipment, and labor to ensure the completion of the project in accordance with the plans and specifications within the time set forth in the proposal.

The Contractor shall provide a comprehensive schedule that details all necessary work efforts and items to complete the work. This schedule shall illustrate a **singular critical path** within the schedule that identifies the progression of critical work tasks that, if not completed in a timely manner, could delay the contract completion. **There shall be only one critical work task along the progression of the schedule's "critical path".** If the critical

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path is not properly shown on the proposed schedule; the approval of the schedule by the Architect/Engineer is subject to rejection. **The critical path noted on the schedule shall be primary test to determine if the Contractor is due additional time for delay for conditions beyond the control of the Contractor.** The Contractor may revise their critical work path as necessary with the submission of a revised project schedule that is approved by the Engineer.

If the Contractor falls significantly behind the submitted schedule, the Contractor shall, upon the Architect/Engineer's request, submit a revised schedule for completion of the work within the contract time and modify their operations to provide such additional materials, equipment, and labor necessary to meet the revised schedule. Should the execution of the work be discontinued for any reason, the Contractor shall notify the Architect/Engineer at least 24 hours in advance of resuming operations.

The Contractor shall not commence any actual construction prior to the date on which the notice to proceed is issued by the OWNER.

80-04 Limitation of Operations. The Contractor shall control his or her operations and the operations of his or her subcontractors and all suppliers to provide for the free and unobstructed movement of aircraft in the air operations areas (AOA) of the airport.

When the work requires the Contractor to conduct his or her operations within an AOA of the airport, the work shall be coordinated with airport operations (through the Architect/Engineer) at least 48 hours prior to commencement of such work. The Contractor shall not close an AOA until so authorized by the Architect/Engineer and until the necessary temporary marking and associated lighting is in place as provided in the subsection 70-08 titled BARRICADES, WARNING SIGNS, AND HAZARD MARKINGS of Section 70.

When the contract work requires the Contractor to work within an AOA of the airport on an intermittent basis (intermittent opening and closing of the AOA), the Contractor shall maintain constant communications as specified; immediately obey all instructions to vacate the AOA; immediately obey all instructions to resume work in such AOA. Failure to maintain the specified communications or to obey instructions shall be cause for suspension of the Contractor's operations in the AOA until the satisfactory conditions are provided. The following AOA cannot be closed to operating aircraft to permit the Contractor's operations on a continuous basis and will therefore be closed to aircraft operations intermittently as follows:

Refer to Project Plans for Partial Closure of the Air Carrier Apron

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Contractor shall be required to conform to safety standards contained in AC 150/5370-2F, Operational Safety on Airports During Construction (see Special Provisions).

80-04.1 Operational Safety on Airport During Construction. All Contractors' operations shall be conducted in accordance with the project Construction Safety and Phasing Plan (CSPP) and the provisions set forth within the current version of AC 150/5370-2F. The CSPP included within the contract documents conveys minimum requirements for operational safety on the airport during construction activities. The Contractor shall prepare and submit a Safety Plan Compliance Document that details how it proposes to comply with the requirements presented within the CSPP.

The Contractor shall implement all necessary safety plan measures prior to commencement of any work activity. The Contractor shall conduct routine checks to assure compliance with the safety plan measures.

The Contractor is responsible to the OWNER for the conduct of all subcontractors it employs on the project. The Contractor shall assure that all subcontractors are made aware of the requirements of the CSPP and that they implement and maintain all necessary measures.

No deviation or modifications may be made to the approved CSPP unless approved in writing by the OWNER or Architect/Engineer.

80-05 Character of Workers, Methods, and Equipment. The Contractor shall, at all times, employ sufficient labor and equipment for prosecuting the work to full completion in the manner and time required by the contract, plans, and specifications.

All workers shall have sufficient skill and experience to perform properly the work assigned to them. Workers engaged in special work or skilled work shall have sufficient experience in such work and in the operation of the equipment required to perform the work satisfactorily.

Any person employed by the Contractor or by any subcontractor who violates any operational regulations or operational safety requirements and, in the opinion of the Architect/Engineer, does not perform his work in a proper and skillful manner or is intemperate or disorderly shall, at the written request of the Architect/Engineer, be removed forthwith by the Contractor or subcontractor employing such person, and shall not be employed again in any portion of the work without approval of the Architect/Engineer.

Should the Contractor fail to remove such persons or person, or fail to furnish suitable and sufficient personnel for the proper execution of the work, the Architect/Engineer may suspend the work by written notice until compliance with such orders.

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In addition, the following requirements shall apply concerning all workers utilized on the project:

a. The Contractor shall provide and maintain, continually on the project site of the work during its progress, adequate and competent superintendence of all operations for and in connection with the work. The Contractor shall provide a capable superintendent acceptable to the Owner. Such representative shall be able to read, write and speak English fluently and shall be authorized to receive instructions from the Engineer or his authorized representative. Said superintendent shall have authority to see that the work is carried out in accordance with the Contract Documents and in a first class, thorough and workmanlike manner in every respect.

b. Incompetent, disorderly, intemperate or incorrigible employees of any authority level shall be dismissed from the project by the Contractor or his representative when requested by the Engineer or the Owner, and such persons shall not again be permitted to return to the work without the written consent of the Owner.

c. The Contractor agrees to indemnify and hold the Owner harmless from any and all loss or damages arising out of jurisdictional labor disputes or other labor troubles of any kind that may occur during the construction and performance of the Contract.

d. The Contractor shall provide at the request of the Owner such reasonable information about his employees as may be necessary, including in part, name, address and social security number.

e. Any employee of the Contractor or any subcontractors who violate the badging requirements or leaves unbadged individuals in the Airport Operations Area (AOA) or the Secured Identification Display Area (SIDA) without properly badged individuals will be removed from the Airport and not be allowed back onto the Airport without prior approval by the Owner.

When the methods and equipment to be used by the Contractor in accomplishing the work are not prescribed in the contract, the Contractor is free to use any methods or equipment that will accomplish the work in conformity with the requirements of the contract, plans, and specifications.

When the contract specifies the use of certain methods and equipment, such methods and equipment shall be used unless others are authorized by the Architect/Engineer. If the Contractor desires to use a method or type of equipment other than specified in the contract, the Contractor may request authority from the Architect/Engineer to do so. The request shall be in writing and shall include a full description of the methods and equipment proposed and of the reasons for desiring to make the change. If approval is given, it will be on the condition that the Contractor will be fully responsible for producing work in conformity with contract requirements. If, after trial use of the substituted methods or equipment, the Architect/Engineer determines that the

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work produced does not meet contract requirements, the Contractor shall discontinue the use of the substitute method or equipment and shall complete the remaining work with the specified methods and equipment. The Contractor shall remove any deficient work and replace it with work of specified quality or take such other corrective action as the Architect/Engineer may direct. No change will be made in basis of payment for the contract items involved nor in contract time as a result of authorizing a change in methods or equipment under this subsection.

80-06 Temporary Suspension of the Work. The OWNER shall have the authority to suspend the work wholly, or in part, for such period or periods as the OWNER may deem necessary, due to unsuitable weather, or such other conditions as are considered unfavorable for the execution of the work, or for such time as is necessary due to the failure on the part of the Contractor to carry out orders given or perform any or all provisions of the contract.

In the event that the Contractor is ordered by the OWNER, in writing, to suspend work for some unforeseen cause not otherwise provided for in the contract and over which the Contractor has no control, the Contractor may be reimbursed for actual money expended on the work during the period of shutdown. No allowance will be made for anticipated profits. The period of shutdown shall be computed from the effective date of the Architect/Engineer's order to suspend work to the effective date of the Architect/Engineer's order to resume the work. Claims for such compensation shall be filed with the Architect/Engineer within the time period stated in the Architect/Engineer's order to resume work. The Contractor shall submit with his or her claim information substantiating the amount shown on the claim. The Architect/Engineer will forward the Contractor's claim to the OWNER for consideration in accordance with local laws or ordinances. No provision of this article shall be construed as entitling the Contractor to compensation for delays due to inclement weather, for suspensions made at the request of the OWNER, or for any other delay provided for in the contract, plans, or specifications.

If it should become necessary to suspend work for an indefinite period, the Contractor shall store all materials in such manner that they will not become an obstruction nor become damaged in any way. The Contractor shall take every precaution to prevent damage or deterioration of the work performed and provide for normal drainage of the work. The Contractor shall erect temporary structures where necessary to provide for traffic on, to, or from the airport.

80-07 Determination and Extension of Contract Time. The number of calendar days allowed for completion of the work shall be stated in the proposal and contract and shall be known as the CONTRACT TIME.

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The Contractor shall notify the Owner and Engineer in writing of any declaration of intent to request a Contract time extension within 15 calendar days from the occurrence of the event that triggered the schedule change.

Failure by the Contractor to follow the aforementioned procedure shall void or otherwise invalidate any Contract time extension requested by the Contractor with the exception of delays associated with abnormal weather conditions. **Claims for additional contract time by the Contractor shall be judged by the Engineer based on the approved contract work schedule and identified “critical path” work tasks.**

Should the contract time require extension for reasons beyond the Contractor's control, it shall be adjusted as follows:

a. Contract Time based on calendar days shall consist of the number of calendar days stated in the contract counting from the effective date of the notice to proceed and including all Saturdays, Sundays, holidays, and non-work days. All calendar days elapsing between the effective dates of the Owner's orders to suspend and resume all work, due to causes not the fault of the Contractor, shall be excluded.

The contract duration and phase durations set forth in the Contract Documents include inclement weather days normally encountered at the Project site, as well as observed holidays defined in General Provision Section 10. The Contractor shall be charged for each calendar day during the term of construction including observed holidays defined in General Provision Section 10 and inclement weather days normally encountered at the Project site. See General Provision Section 10 – Calendar Day for definition of normal inclement weather and observed holidays.

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Failure to Complete on Time. For each calendar day ~~or working day~~, as specified in the contract, that any work remains uncompleted after the contract time (including all extensions and adjustments as provided in the subsection 80-07 titled DETERMINATION AND EXTENSION OF CONTRACT TIME of this Section) the sum specified in the contract and proposal as liquidated damages will be deducted from any money due or to become due the Contractor or his or her surety. Such deducted sums shall not be deducted as a penalty but shall be considered as liquidation of a reasonable portion of damages including but not limited to additional engineering services that will be incurred by the OWNER should the Contractor fail to complete the work in the time provided in their contract.

Liquidated Damages for failure to complete within contract time shall be \$1,500.00 (Fifteen Hundred Dollars) per Calendar Day.

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Permitting the Contractor to continue and finish the work or any part of it after the time fixed for its completion, or after the date to which the time for completion may have been extended, will in no way operate as a waiver on the part of the Owner of any of its rights under the contract.

80-09 Default and Termination of Contract. The Contractor shall be considered in default of his or her contract and such default will be considered as cause for the OWNER to terminate the contract for any of the following reasons if the Contractor:

- a. Fails to begin the work under the contract within the time specified in the Notice to Proceed, or
- b. Fails to perform the work or fails to provide sufficient workers, equipment and/or materials to assure completion of work in accordance with the terms of the contract, or
- c. Performs the work unsuitably or neglects or refuses to remove materials or to perform anew such work as may be rejected as unacceptable and unsuitable, or
- d. Discontinues the execution of the work, or
- e. Fails to resume work which has been discontinued within a reasonable time after notice to do so, or
- f. Becomes insolvent or is declared bankrupt, or commits any act of bankruptcy or insolvency, or
- g. Allows any final judgment to stand against the Contractor unsatisfied for a period of 10 days, or
- h. Makes an assignment for the benefit of creditors, or
- i. For any other cause whatsoever, fails to carry on the work in an acceptable manner.

Should the Architect/Engineer consider the Contractor in default of the contract for any reason above, the Architect/Engineer shall immediately give written notice to the Contractor and the Contractor's surety as to the reasons for considering the Contractor in default and the OWNER's intentions to terminate the contract.

If the Contractor or surety, within a period of 10 days after such notice, does not proceed in accordance therewith, then the OWNER will, upon written notification from the Architect/Engineer of the facts of such delay, neglect, or default and the Contractor's failure to comply with such notice, have full power

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and authority without violating the contract, to take the execution of the work out of the hands of the Contractor. The OWNER may appropriate or use any or all materials and equipment that have been mobilized for use in the work and are acceptable and may enter into an agreement for the completion of said contract according to the terms and provisions thereof, or use such other methods as in the opinion of the Architect/Engineer will be required for the completion of said contract in an acceptable manner.

All costs and charges incurred by the OWNER, together with the cost of completing the work under contract, will be deducted from any monies due or which may become due the Contractor. If such expense exceeds the sum which would have been payable under the contract, then the Contractor and the surety shall be liable and shall pay to the OWNER the amount of such excess.

80-10 Termination for National Emergencies. The OWNER shall terminate the contract or portion thereof by written notice when the Contractor is prevented from proceeding with the construction contract as a direct result of an Executive Order of the President with respect to the execution of war or in the interest of national defense.

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When the contract, or any portion thereof, is terminated before completion of all items of work in the contract, payment will be made for the actual number of units or items of work completed at the contract price or as mutually agreed for items of work partially completed or not started. No claims or loss of anticipated profits shall be considered.

Reimbursement for organization of the work, and other overhead expenses, (when not otherwise included in the contract) and moving equipment and materials to and from the job will be considered, the intent being that an equitable settlement will be made with the Contractor.

Acceptable materials, obtained or ordered by the Contractor for the work and that are not incorporated in the work shall, at the option of the Contractor, be purchased from the Contractor at actual cost as shown by receipted bills and actual cost records at such points of delivery as may be designated by the Architect/Engineer.

Termination of the contract or a portion thereof shall neither relieve the Contractor of his or her responsibilities for the completed work nor shall it relieve his or her surety of its obligation for and concerning any just claim arising out of the work performed.

- 80-11 Work Area, Storage Area and Sequence of Operations.** The Contractor shall obtain approval from the Architect/Engineer prior to beginning any work in all areas of the airport. No operating runway, taxiway, or air operations area (AOA) shall be crossed, entered, or obstructed while it is operational. The Contractor shall plan and coordinate his or her work in such a manner as to ensure safety and a minimum of hindrance to flight operations. All Contractor equipment and material stockpiles shall be stored a minimum of 700 feet from the centerline of an active runway. No equipment will be allowed to park within the approach area of an active runway at any time. No equipment shall be within 500 feet of an active runway at any time.

END OF SECTION 80

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SECTION 90

MEASUREMENT AND PAYMENT

90-01 Measurement of Quantities. *All Any unit price* work completed under the contract will be measured by the ENGINEER, or his or her authorized representatives, using United States Customary Units of Measurement or the International System of Units.

The method of measurement and computations to be used in determination of quantities of material furnished and of work performed under the contract will be those methods generally recognized as conforming to good engineering practice.

Unless otherwise specified, longitudinal measurements for area computations will be made horizontally, and no deductions will be made for individual fixtures (or leave-outs) having an area of 9 square feet or less. Unless otherwise specified, transverse measurements for area computations will be the neat dimensions shown on the plans or ordered in writing by the ENGINEER.

Structures will be measured according to neat lines shown on the plans or as altered to fit field conditions.

Unless otherwise specified, all contract items which are measured by the linear foot such as electrical ducts, conduits, pipe culverts, underdrains, and similar items shall be measured parallel to the base or foundation upon which such items are placed.

In computing volumes of excavation the average end area method or other acceptable methods will be used.

The thickness of plates and galvanized sheet used in the manufacture of corrugated metal pipe, metal plate pipe culverts and arches, and metal cribbing will be specified and measured in decimal fraction of inch.

The term “ton” will mean the short ton consisting of 2,000 lb avoirdupois. All materials that are measured or proportioned by weights shall be weighed on accurate, approved scales by competent, qualified personnel at locations designed by the ENGINEER. If material is shipped by rail, the car weight may be accepted provided that only the actual weight of material is paid for. However, car weights will not be acceptable for material to be passed through mixing plants. Trucks used to haul material being paid for by weight shall be weighed empty daily at such times as the ENGINEER directs, and each truck shall bear a plainly legible identification mark.

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Materials to be measured by volume in the hauling vehicle shall be hauled in approved vehicles and measured therein at the point of delivery. Vehicles for this purpose may be of any size or type acceptable for the materials hauled, provided that the body is of such shape that the actual contents may be readily and accurately determined. All vehicles shall be loaded to at least their water level capacity, and all loads shall be leveled when the vehicles arrive at the point of delivery.

When requested by the Contractor and approved by the ENGINEER in writing, material specified to be measured by the cubic yard may be weighed, and such weights will be converted to cubic yards for payment purposes. Factors for conversion from weight measurement to volume measurement will be determined by the ENGINEER and shall be agreed to by the Contractor before such method of measurement of pay quantities is used.

Bituminous materials will be measured by the gallon or ton. When measured by volume, such volumes will be measured at 60°F or will be corrected to the volume at 60°F using ASTM D1250 for asphalts or ASTM D633 for tars.

Net certified scale weights or weights based on certified volumes in the case of rail shipments will be used as a basis of measurement, subject to correction when bituminous material has been lost from the car or the distributor, wasted, or otherwise not incorporated in the work.

When bituminous materials are shipped by truck or transport, net certified weights by volume, subject to correction for loss or foaming, may be used for computing quantities.

Cement will be measured by the ton or hundredweight.

Timber will be measured by the thousand feet board measure (MFBM) actually incorporated in the structure. Measurement will be based on nominal widths and thicknesses and the extreme length of each piece.

The term “lump sum” when used as an item of payment will mean complete payment for the work described in the contract.

When a complete structure or structural unit (in effect, “lump sum” work) is specified as the unit of measurement, the unit will be construed to include all necessary fittings and accessories.

Rental of equipment will be measured by time in hours of actual working time and necessary traveling time of the equipment within the limits of the work. Special equipment ordered by the ENGINEER in connection with force account work will be measured as agreed in the change order or supplemental

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agreement authorizing such force account work as provided in the subsection 90-05 titled PAYMENT FOR EXTRA WORK of this section.

When standard manufactured items are specified such as fence, wire, plates, rolled shapes, pipe conduit, etc., and these items are identified by gauge, unit weight, section dimensions, etc., such identification will be considered to be nominal weights or dimensions. Unless more stringently controlled by tolerances in cited specifications, manufacturing tolerances established by the industries involved will be accepted.

Scales for weighing materials which are required to be proportioned or measured and paid for by weight shall be furnished, erected, and maintained by the Contractor, or be certified permanently installed commercial scales.

Scales shall be accurate within 1/2% of the correct weight throughout the range of use. The Contractor shall have the scales checked under the observation of the inspector before beginning work and at such other times as requested. The intervals shall be uniform in spacing throughout the graduated or marked length of the beam or dial and shall not exceed one-tenth of 1% of the nominal rated capacity of the scale, but not less than 1 pound. The use of spring balances will not be permitted.

Beams, dials, platforms, and other scale equipment shall be so arranged that the operator and the inspector can safely and conveniently view them.

Scale installations shall have available ten standard 50-pound weights for testing the weighing equipment or suitable weights and devices for other approved equipment.

Scales must be tested for accuracy and serviced before use at a new site. Platform scales shall be installed and maintained with the platform level and rigid bulkheads at each end.

Scales "overweighing" (indicating more than correct weight) will not be permitted to operate, and all materials received subsequent to the last previous correct weighting-accuracy test will be reduced by the percentage of error in excess of one-half of 1%.

In the event inspection reveals the scales have been underweighing (indicating less than correct weight), they shall be adjusted, and no additional payment to the Contractor will be allowed for materials previously weighed and recorded.

All costs in connection with furnishing, installing, certifying, testing, and maintaining scales; for furnishing check weights and scale house; and for all other items specified in this subsection, for the weighing of materials for

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proportioning or payment, shall be included in the unit contract prices for the various items of the project.

When the estimated quantities for a specific portion of the work are designated as the pay quantities in the contract, they shall be the final quantities for which payment for such specific portion of the work will be made, unless the dimensions of said portions of the work shown on the plans are revised by the ENGINEER. If revised dimensions result in an increase or decrease in the quantities of such work, the final quantities for payment will be revised in the amount represented by the authorized changes in the dimensions.

90-02 Scope of Payment. The Contractor shall receive and accept compensation provided for in the contract as full payment for furnishing all materials, for performing all work under the contract in a complete and acceptable manner, and for all risk, loss, damage, or expense of whatever character arising out of the nature of the work or the execution thereof, subject to the provisions of the subsection 70-18 titled NO WAIVER OF LEGAL RIGHTS of Section 70.

When the “basis of payment” subsection of a technical specification requires that the contract price (price bid) include compensation for certain work or material essential to the item, this same work or material will not also be measured for payment under any other contract item which may appear elsewhere in the contract, plans, or specifications.

90-03 Compensation for Altered Quantities. When the accepted quantities of work vary from the quantities in the proposal, the Contractor shall accept as payment in full, so far as contract items are concerned, payment at the original contract price for the accepted quantities of work actually completed and accepted. No allowance, except as provided for in the subsection 40-02 titled ALTERATION OF WORK AND QUANTITIES of Section 40 will be made for any increased expense, loss of expected reimbursement, or loss of anticipated profits suffered or claimed by the Contractor which results directly from such alterations or indirectly from his or her unbalanced allocation of overhead and profit among the contract items, or from any other cause.

90-04 Payment for Omitted Items. As specified in the subsection 40-03 titled OMITTED ITEMS of Section 40, the ENGINEER shall have the right to omit from the work (order nonperformance) any contract item, except major contract items, in the best interest of the OWNER.

Should the ENGINEER omit or order nonperformance of a contract item or portion of such item from the work, the Contractor shall accept payment in full at the contract prices *or as agreed by change order* for any work actually completed and acceptable prior to the ENGINEER's order to omit or non-perform such contract item.

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Acceptable materials ordered by the Contractor or delivered on the work prior to the date of the ENGINEER's order will be paid for at the actual cost to the Contractor and shall thereupon become the property of the OWNER.

In addition to the reimbursement hereinbefore provided, the Contractor shall be reimbursed for all actual costs incurred for the purpose of performing the omitted contract item prior to the date of the ENGINEER's order. Such additional costs incurred by the Contractor must be directly related to the deleted contract item and shall be supported by certified statements by the Contractor as to the nature the amount of such costs.

90-05 Payment for Extra Work. Extra work, performed in accordance with the subsection 40-04 titled EXTRA WORK of Section 40, will be paid for at the contract prices or agreed prices specified in the change order or supplemental agreement authorizing the extra work.

90-06 Partial Payments. Partial payments will be made to the Contractor at least once each month as the work progresses. Said payments will be based upon estimates, prepared by the *Contractor* ~~ENGINEER~~, of the value of the work performed and materials complete and in place, in accordance with the contract, plans, and specifications. Such partial payments may also include the delivered actual cost of those materials stockpiled and stored in accordance with the subsection 90-07 titled PAYMENT FOR MATERIALS ON HAND of this section. No partial payment will be made when the amount due to the Contractor since the last estimate amounts to less than five hundred dollars.

The Contractor is required to pay all subcontractors for satisfactory performance of their contracts no later than 30 days after the Contractor has received a partial payment. The OWNER must ensure prompt and full payment of retainage from the prime Contractor to the subcontractor within 30 days after the subcontractor's work is satisfactorily completed. A subcontractor's work is satisfactorily completed when all the tasks called for in the subcontract have been accomplished and documented as required by the OWNER. When the OWNER has made an incremental acceptance of a portion of a prime contract, the work of a subcontractor covered by that acceptance is deemed to be satisfactorily completed.

From the total of the amount determined to be payable on a partial payment, five (5) percent of such total amount will be deducted and retained by the OWNER until the final payment is made, except as may be provided (at the Contractor's option) in the subsection 90-08 titled PAYMENT OF WITHHELD FUNDS of this section. The balance (ninety-five (95) percent) of the amount payable, less all previous payments, shall be certified for payment. Should the Contractor exercise his or her option, as provided in the subsection 90-08 titled

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PAYMENT OF WITHHELD FUNDS of this section, no such percent retainage shall be deducted.

When at least 95% of the work has been completed, the ENGINEER shall, at the OWNER's discretion and with the consent of the surety, prepare estimates of both the contract value and the cost of the remaining work to be done.

The OWNER may retain an amount not less than twice the contract value or estimated cost, whichever is greater, of the work remaining to be done. The remainder, less all previous payments and deductions, will then be certified for payment to the Contractor.

It is understood and agreed that the Contractor shall not be entitled to demand or receive partial payment based on quantities of work in excess of ~~that those~~ provided in the proposal or covered by approved change orders or supplemental agreements. ~~except when such excess quantities have been determined by the ENGINEER to be a part of the final quantity for the item of work in question.~~

No partial payment shall bind the OWNER to the acceptance of any materials or work in place as to quality or quantity. All partial payments are subject to correction at the time of final payment as provided in the subsection 90-09 titled ACCEPTANCE AND FINAL PAYMENT of this section.

The Contractor shall deliver to the OWNER a complete release of all claims for labor and material arising out of this contract before the final payment is made. If any subcontractor or supplier fails to furnish such a release in full, the Contractor may furnish a bond or other collateral satisfactory to the OWNER to indemnify the OWNER against any potential lien or other such claim. The bond or collateral shall include all costs, expenses, and attorney fees the OWNER may be compelled to pay in discharging any such lien or claim.

90-07 Payment for Materials on Hand. Partial payments may be made to the extent of the delivered cost of materials to be incorporated in the work, provided that such materials meet the requirements of the contract, plans, and specifications and are delivered to acceptable sites on the airport property or at other sites in the vicinity that are acceptable to the OWNER. Such delivered costs of stored or stockpiled materials may be included in the next partial payment after the following conditions are met:

- a. The material has been stored or stockpiled in a manner acceptable to the ENGINEER at or on an approved site.
- b. The Contractor has furnished the ENGINEER with acceptable evidence of the quantity and quality of such stored or stockpiled materials.

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- c. The Contractor has furnished the ENGINEER with satisfactory evidence that the material and transportation costs have been paid.
- d. The Contractor has furnished the OWNER legal title (free of liens or encumbrances of any kind) to the material so stored or stockpiled.
- e. The Contractor has furnished the OWNER evidence that the material so stored or stockpiled is insured against loss by damage to or disappearance of such materials at any time prior to use in the work.

It is understood and agreed that the transfer of title and the OWNER's payment for such stored or stockpiled materials shall in no way relieve the Contractor of his or her responsibility for furnishing and placing such materials in accordance with the requirements of the contract, plans, and specifications.

In no case will the amount of partial payments for materials on hand exceed the contract price for such materials or the contract price for the contract item in which the material is intended to be used.

No partial payment will be made for stored or stockpiled living or perishable plant materials.

The Contractor shall bear all costs associated with the partial payment of stored or stockpiled materials in accordance with the provisions of this subsection.

90-08 Payment of Withheld Funds. At the Contractor's option, if an OWNER withholds retainage in accordance with the methods described in subsection 90-06 PARTIAL PAYMENTS, the Contractor may request that the OWNER deposit the retainage into an escrow account. The OWNER's deposit of retainage into an escrow account is subject to the following conditions:

- a. The Contractor shall bear all expenses of establishing and maintaining an escrow account and escrow agreement acceptable to the OWNER.
- b. The Contractor shall deposit to and maintain in such escrow only those securities or bank certificates of deposit as are acceptable to the OWNER and having a value not less than the retainage that would otherwise be withheld from partial payment.
- c. The Contractor shall enter into an escrow agreement satisfactory to the OWNER.
- d. The Contractor shall obtain the written consent of the surety to such agreement.

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90-09 Acceptance and Final Payment. When the contract work has been accepted in accordance with the requirements of the subsection 50-15 titled FINAL ACCEPTANCE of Section 50, the ENGINEER will prepare *a statement of the final contract price including all prior change orders and supplemental agreements, and any final change order items.* ~~the final estimate of the items of work actually performed.~~ The Contractor shall approve the ENGINEER's final estimate *statement* or advise the ENGINEER of the Contractor's objections. ~~to the final estimate which are based on disputes in measurements or computations of the final quantities to be paid under the contract as amended by change order or supplemental agreement.~~ The Contractor and the ENGINEER shall resolve all disputes (if any) ~~in the measurement and computation of final quantities to be paid~~ within 30 calendar days of the Contractor's receipt of the ENGINEER's final *estimate statement*. If, after such 30-day period, a dispute still exists, the Contractor may approve the ENGINEER's *final contract price estimate* under protest of the *amount* ~~quantities~~ in dispute, and such disputed *amount* ~~quantities~~ shall be considered by the OWNER as a claim in accordance with the subsection 50-16 titled CLAIMS FOR ADJUSTMENT AND DISPUTES of Section 50.

After the Contractor has approved, or approved under protest, the ENGINEER's final estimate, and after the ENGINEER's receipt of the project closeout documentation required in subsection 90-11 Project Closeout, final payment will be processed based on the entire sum, or the undisputed sum in case of approval under protest, determined to be due the Contractor less all previous payments and all amounts to be deducted under the provisions of the contract. All prior partial estimates and payments shall be subject to correction in the final estimate and payment.

If the Contractor has filed a claim for additional compensation under the provisions of the subsection 50-16 titled CLAIMS FOR ADJUSTMENTS AND DISPUTES of Section 50 or under the provisions of this subsection, such claims will be considered by the OWNER in accordance with local laws or ordinances. Upon final adjudication of such claims, any additional payment determined to be due the Contractor will be paid pursuant to a supplemental final estimate.

90-10 Construction Warranty.

- a. In addition to any other warranties in this contract, the Contractor warrants that work performed under this contract conforms to the contract requirements and is free of any defect in equipment, material, workmanship, or design furnished, or performed by the Contractor or any subcontractor or supplier at any tier.

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- b. This warranty shall continue for a period of one year from the date of final acceptance of the work. If the OWNER takes possession of any part of the work before final acceptance, this warranty shall continue for a period of one year from the date the OWNER takes possession. However, this will not relieve the Contractor from corrective items required by the final acceptance of the project work.
- c. The Contractor shall remedy at the Contractor's expense any failure to conform, or any defect. In addition, the Contractor shall remedy at the Contractor's expense any damage to OWNER real or personal property, when that damage is the result of:
 - (1) The Contractor's failure to conform to contract requirements; or
 - (2) Any defect of equipment, material, workmanship, or design furnished by the Contractor.
- d. The Contractor shall restore any work damaged in fulfilling the terms and conditions of this clause. The Contractor's warranty with respect to work repaired or replaced will run for one year from the date of repair or replacement.
- e. The OWNER will notify the Contractor, in writing, within **[seven (7)]** days after the discovery of any failure, defect, or damage.
- f. If the Contractor fails to remedy any failure, defect, or damage within **[14]** days after receipt of notice, the OWNER shall have the right to replace, repair, or otherwise remedy the failure, defect, or damage at the Contractor's expense.
- g. With respect to all warranties, express or implied, from subcontractors, manufacturers, or suppliers for work performed and materials furnished under this contract, the Contractor shall: (1) Obtain all warranties that would be given in normal commercial practice; (2) Require all warranties to be executed, in writing, for the benefit of the OWNER, as directed by the OWNER, and (3) Enforce all warranties for the benefit of the OWNER.
- h. This warranty shall not limit the OWNER's rights with respect to latent defects, gross mistakes, or fraud.

90-11 Project Closeout. Approval of final payment to the Contractor is contingent upon completion and submittal of the items listed below. The final payment will not be approved until the ENGINEER approves the Contractor's final submittal. The Contractor shall:

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- a.** Provide two (2) copies of all manufacturers warranties specified for materials, equipment, and installations.
- b.** Provide weekly payroll records (not previously received) from the general Contractor and all subcontractors.
- c.** Complete final cleanup in accordance with subsection 40-08, FINAL CLEANUP.
- d.** Complete all punch list items identified during the Final Inspection.
- e.** Provide complete release of all claims for labor and material arising out of the Contract.
- f.** Provide a certified statement signed by the subcontractors, indicating actual amounts paid to the Disadvantaged Business Enterprise (DBE) subcontractors and/or suppliers associated with the project.
- g.** When applicable per state requirements, return copies of sales tax completion forms.
- h.** Manufacturer's certifications for all items incorporated in the work.
- i.** All required record drawings, as-built drawings or as-constructed drawings.
- j.** Project Operation and Maintenance (O&M) Manual.
- k.** Security for Construction Warranty.
- l.** Equipment commissioning documentation submitted, if required.

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SECTION 100

CONTRACTOR QUALITY CONTROL PROGRAM

100-01 General. When the specification requires a Contractor Quality Control Program, the Contractor shall establish, provide, and maintain an effective Quality Control Program that details the methods and procedures that will be taken to assure that all materials and completed construction required by this contract conform to contract plans, technical specifications and other requirements, whether manufactured by the Contractor, or procured from subcontractors or vendors. Although guidelines are established and certain minimum requirements are specified here and elsewhere in the contract technical specifications, the Contractor shall assume full responsibility for accomplishing the stated purpose.

The intent of this section is to enable the Contractor to establish a necessary level of control that will:

- a. Adequately provide for the production of acceptable quality materials.
- b. Provide sufficient information to assure both the Contractor and the Architect/Engineer that the specification requirements can be met.
- c. Allow the Contractor as much latitude as possible to develop his or her own standard of control.

The Contractor shall be prepared to discuss and present, at the preconstruction conference, their understanding of the quality control requirements. **The Contractor shall not begin any construction or production of materials to be incorporated into the completed work until the Quality Control Program has been reviewed and accepted by the Architect/Engineer and a written finding of no objection to the Quality Control Program is provided by the Architect/Engineer.** No partial payment will be made for materials subject to specific quality control requirements until the Quality Control Program has been reviewed and a written finding of no objection to the Quality Control Program is provided by the Architect/Engineer.

The quality control requirements shall be provided solely by the Contractor as contained in this section and elsewhere in the contract technical specifications are in addition to and separate from the acceptance testing requirements. Separate acceptance testing requirements are the responsibility of the Owner. The Owner may elect to take whatever number of samples and conduct tests as the Owner deems appropriate; or may elect to accept tests for materials provided by the Contractor's quality control testing program. The Contractor shall be solely responsible for all retesting costs for failing **assurance** tests conducted by the Owner.

100-02 Description of program.

a. General description. The Contractor shall establish a Quality Control Program to perform quality control inspection and testing of all items of work required by the technical specifications, including those performed by subcontractors. This Quality Control

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Program shall ensure conformance to applicable specifications and plans with respect to materials, workmanship, construction, finish, and functional performance. The Quality Control Program shall be effective for control of all construction work performed under this Contract and shall specifically include surveillance and tests required by the technical specifications, in addition to other requirements of this section and any other activities deemed necessary by the Contractor to establish an effective level of quality control. All quality control testing shall be performed by the Contractor at no additional cost to the Owner.

b. Quality Control Program. The Contractor shall describe the Quality Control Program in a written document that shall be reviewed and approved by the Architect/Engineer prior to the start of any production, construction, or off-site fabrication. **The written draft Quality Control Program shall be submitted to the Architect/Engineer for review and approval at least five calendar days before the Preconstruction Conference.** The Contractor's Quality Control Plan and third party Quality Control testing laboratory must be approved in writing by the Architect/Engineer prior to the Notice to Proceed (NTP).

The Quality Control Program shall be organized to address, as a minimum, the following items:

- a. Quality control organization and communication plan
- b. Project progress schedule
- c. Submittals schedule
- d. Inspection requirements
- e. Quality control testing plan
- f. Documentation of quality control activities
- g. Requirements for corrective action when quality control and/or acceptance criteria are not met
- h. Compliance with any special testing or inspections required by State or County code.

The Contractor is encouraged to add any additional elements to the Quality Control Program that is deemed necessary to adequately control all production and/or construction processes required by this contract.

The cost of development, administration and/or performance of the Quality Control Program shall be paid for by the Contractor and said costs shall be incidental to the various other bid items.

100-03 Quality control organization. The Contractor Quality Control Program shall be implemented by the establishment of a separate (third party) quality control organization. An organizational chart shall be developed to show all quality control personnel and how these personnel integrate with other management/production and construction functions and personnel.

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The organizational chart shall identify all quality control staff by name and function, and shall indicate the total staff required to implement all elements of the Quality Control Program, including inspection and testing for each item of work. A third party independent testing laboratory shall be used for implementation of all the Quality Control Program. Testing personnel assigned shall be subject to the qualification requirements of paragraph 100-03a and 100-03b. The organizational chart shall indicate which personnel are Contractor employees and which are provided by an outside organization.

The quality control organization shall, as a minimum, consist of the following personnel:

a. Program Administrator. The Program Administrator shall be a full-time employee of the Contractor, or a consultant engaged by the Contractor. The Program Administrator shall have a minimum of five (5) years of experience in airport and/or building construction and shall have had prior quality control experience on a project of comparable size and scope as the contract.

Additional qualifications for the Program Administrator shall include at least one of the following requirements:

(1) Registered Architect or Professional Engineer with one (1) year of airport construction experience.

(2) Engineer-in-training with two (2) years of airport experience.

(3) An individual with three (3) years of building experience, with a Bachelor Degree in Architecture, Engineering or Construction.

(4) Construction materials technician certified at Level III by the National Institute for Certification in Engineering Technologies (NICET).

(5) A NICET certified engineering technician in Civil Engineering Technology with five (5) years of airport experience.

The Program Administrator shall have full authority to institute any and all actions necessary for the successful implementation of the Quality Control Program to ensure compliance with the contract plans and technical specifications. The Program Administrator shall report directly to a responsible officer of the construction firm. The Program Administrator may supervise the Quality Control Program on more than one project provided that person can be at the job site within two (2) hours after being notified of a problem.

b. Quality control technicians. A sufficient number of quality control technicians necessary to adequately implement the Quality Control Program shall be provided. These personnel shall be either Engineers, engineering technicians, or experienced craftsman with qualifications in the appropriate field equivalent to NICET Level II or higher construction materials technician or highway construction technician and shall have a minimum of two (2) years of experience in their area of expertise.

The quality control technicians shall report directly to the Program Administrator and shall perform the following functions:

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(1) Inspection of all materials, construction, plant, and equipment for conformance to the technical specifications, and as required by subsection 100-06.

(2) Performance of all quality control tests as required by the technical specifications and subsection 100-07.

(3) Performance of density tests for the Architect/Engineer when required by the technical specifications.

Certification at an equivalent level, by a state or nationally recognized organization will be acceptable in lieu of NICET certification.

c. Staffing levels. The Contractor or their independent testing laboratory shall provide sufficient qualified quality control personnel to monitor each work activity at all times. Where material is being produced in a plant for incorporation into the work, separate plant and field technicians shall be provided at each plant and field placement location. The scheduling and coordinating of all inspection and testing must match the type and pace of work activity. The Quality Control Program shall state where different technicians will be required for different work elements.

100-04 Project progress schedule. The Contractor shall submit a coordinated construction schedule for all work activities. The schedule shall be prepared as a network diagram in **singular** Critical Path Method (CPM), Program Evaluation and Review Technique (PERT), or other format, or as otherwise specified in the contract. As a minimum, it shall provide information on the sequence of work critical path activities, milestone dates, and activity duration.

The Contractor shall maintain the work schedule and provide an update and analysis of the progress schedule on a twice monthly basis, or as otherwise specified in the contract. Submission of the work schedule shall not relieve the Contractor of overall responsibility for scheduling, sequencing, and coordinating all work to comply with the requirements of the contract.

100-05 Submittals schedule. The Contractor shall submit a detailed listing of all submittals (for example, mix designs, material certifications) and shop drawings required by the technical specifications. The listing can be developed in a spreadsheet format and shall include:

- a. Specification item number
- b. Item description
- c. Description of submittal
- d. Specification paragraph requiring submittal
- e. Scheduled date of submittal

100-06 Inspection requirements. Quality control inspection functions shall be organized to provide inspections for all definable features of work, as detailed below. All inspections shall be documented by the Contractor as specified by subsection 100-07. All special inspections required for building construction required by the State or County shall the

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responsibility and cost of the Owner. All other inspections shall be the responsibility of the Contractor.

Inspections shall be performed daily to ensure continuing compliance with contract requirements until completion of the particular feature of work. These shall include the following minimum requirements:

a. During plant operation for material production, quality control test results and periodic inspections shall be used to ensure the quality of aggregates and other mix components, and to adjust and control mix proportioning to meet the approved mix design and other requirements of the technical specifications. All equipment used in proportioning and mixing shall be inspected to ensure its proper operating condition. The Quality Control Program shall detail how these and other quality control functions will be accomplished and used.

b. During field operations, quality control test results and periodic inspections shall be used to ensure the quality of all materials and workmanship. All equipment used in placing, finishing, and compacting shall be inspected to ensure its proper operating condition and to ensure that all such operations are in conformance to the technical specifications and are within the plan dimensions, lines, grades, and tolerances specified. The Program shall document how these and other quality control functions will be accomplished and used.

100-07 Quality control testing plan. As a part of the overall Quality Control Program, the Contractor shall implement a quality control testing plan, as required by the technical specifications. The testing plan shall include the minimum tests and test frequencies required by each technical specification item, as well as any additional quality control tests that the Contractor deems necessary to adequately control production and/or construction processes.

The testing plan can be developed in a spreadsheet fashion and shall, as a minimum, include the following:

- a. Specification item number (for example, P-401)
- b. Item description (for example, Plant Mix Bituminous Pavements)
- c. Test type (for example, gradation, grade, asphalt content, mil spec)
- d. Test standard (for example, ASTM or American Association of State Highway and Transportation Officials (AASHTO) test number, as applicable)
- e. Test frequency (for example, as required by technical specifications or minimum frequency when requirements are not stated)
- f. Responsibility (for example, plant technician)
- g. Control requirements (for example, target, permissible deviations)

The testing plan shall contain a statistically-based procedure of random sampling for acquiring test samples in accordance with ASTM D3665. The Architect/Engineer shall be provided the opportunity to witness quality control sampling and testing. The

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Architect/Engineer may elect to have Contractor's independent testing laboratory take/make testing samples (cores, cylinders, beams, etc.) or obtain/make samples from the Architect/Engineer's testing lab. The Architect/Engineer may elect to store materials samples used for assurance testing (curing) in approved shelters being used by the Contractor or shelters at locations provided by the Architect/Engineer.

All quality control test results shall be documented by the Contractor as required by subsection 100-08.

100-08 Documentation. The Contractor shall maintain current quality control records of all inspections and tests performed. These records shall include factual evidence that the required inspections or tests have been performed, including type and number of inspections or tests involved; results of inspections or tests; nature of defects, deviations, causes for rejection, etc.; proposed remedial action; and corrective actions taken. **Copies of all Quality Control testing and formal inspections shall be transmitted daily to the Architect/Engineer upon receipt from the testing labor inspector. NO exceptions. The Contractor shall submit additional copies of testing reports or inspections to the governing authority, when the authority so directs.**

These records must cover both conforming and defective or deficient features, and must include a statement that all supplies and materials incorporated in the work are in full compliance with the terms of the contract. Legible copies of these records shall be furnished to the Architect/Engineer daily. The records shall cover all work placed subsequent to the previously furnished records and shall be verified and signed by the Contractor's Program Administrator.

Specific Contractor quality control records required for the contract shall include, but are not necessarily limited to, the following records:

a. Daily inspection reports. Each Contractor quality control technician shall maintain a daily log of all inspections performed for both Contractor and subcontractor operations. These technician's daily reports shall provide factual evidence that continuous quality control inspections have been performed and shall, as a minimum, include the following:

- (1) Technical specification item number and description
- (2) Compliance with approved submittals
- (3) Proper storage of materials and equipment
- (4) Proper operation of all equipment
- (5) Adherence to plans and technical specifications
- (6) Review of quality control tests
- (7) Safety inspection.

The daily inspection reports shall identify inspections conducted, results of inspections, location and nature of defects found, causes for rejection, and remedial or corrective actions taken or proposed.

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The daily inspection reports shall be signed by the responsible quality control technician and the Program Administrator. The Architect/Engineer shall be provided at least one copy of each daily inspection report on the work day following the day of record.

b. Daily test reports. The Contractor shall be responsible for establishing a system that will record all quality control test results. Daily test reports shall document the following information:

- (1) Technical specification item number and description
- (2) Test designation
- (3) Location
- (4) Date of test
- (5) Control requirements
- (6) Test results
- (7) Causes for rejection
- (8) Recommended remedial actions
- (9) Retests

Test results from each day's work period shall be submitted to the Architect/Engineer prior to the start of the next day's work period. When required by the technical specifications, the Contractor shall maintain statistical quality control charts. The daily test reports shall be signed by the responsible quality control technician and the Program Administrator.

100-09 Corrective action requirements. The Quality Control Program shall indicate the appropriate action to be taken when a process is deemed, or believed, to be out of control (out of tolerance) and detail what action will be taken to bring the process into control. The requirements for corrective action shall include both general requirements for operation of the Quality Control Program as a whole, and for individual items of work contained in the technical specifications.

The Quality Control Program shall detail how the results of quality control inspections and tests will be used for determining the need for corrective action and shall contain clear sets of rules to gauge when a process is out of control and the type of correction to be taken to regain process control.

When applicable or required by the technical specifications, the Contractor shall establish and use statistical quality control charts for individual quality control tests. The requirements for corrective action shall be linked to the control charts.

100-10 Surveillance by the Architect/Engineer. All items of material and equipment shall be subject to surveillance by the Architect/Engineer at the point of production, manufacture or shipment to determine if the Contractor, producer, manufacturer or shipper maintains an adequate quality control system in conformance with the requirements detailed here and the applicable technical specifications and plans. In addition, all items of materials, equipment and work in place shall be subject to surveillance by the Architect/Engineer at the site for the same purpose.

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Surveillance by the Architect/Engineer does not relieve the Contractor of performing quality control inspections of either on-site or off-site Contractor's or subcontractor's work.

100-11 Noncompliance.

a. The Architect/Engineer will notify the Contractor of any noncompliance with any of the foregoing requirements. The Contractor shall, after receipt of such notice, immediately take corrective action. Any notice, when delivered by the Architect/Engineer or his or her authorized representative to the Contractor or his or her authorized representative at the site of the work, shall be considered sufficient notice.

b. In cases where quality control activities do not comply with either the Contractor Quality Control Program or the contract provisions, or where the Contractor fails to properly operate and maintain an effective Quality Control Program, as determined by the Architect/Engineer, the Architect/Engineer may:

(1) Order the Contractor to replace ineffective or unqualified quality control personnel or subcontractors.

(2) Order the Contractor to stop operations until appropriate corrective actions are taken.

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SECTION 110

METHOD OF ESTIMATING PERCENTAGE OF MATERIAL WITHIN SPECIFICATION LIMITS (PWL)

110-01 General. When the specifications provide for acceptance of material based on the method of estimating percentage of material within specification limits (PWL), the PWL will be determined in accordance with this section. All test results for a lot will be analyzed statistically to determine the total estimated percent of the lot that is within specification limits. The PWL is computed using the sample average ($\bar{X}$) and sample standard deviation (S_n) of the specified number (n) of sublots for the lot and the specification tolerance limits, L for lower and U for upper, for the particular acceptance parameter. From these values, the respective Quality index, Q_L for Lower Quality Index and/or Q_U for Upper Quality Index, is computed and the PWL for the lot for the specified n is determined from Table 1. All specification limits specified in the technical sections shall be absolute values. Test results used in the calculations shall be to the significant figure given in the test procedure.

There is some degree of uncertainty (risk) in the measurement for acceptance because only a small fraction of production material (the population) is sampled and tested. This uncertainty exists because all portions of the production material have the same probability to be randomly sampled. The Contractor's risk is the probability that material produced at the acceptable quality level is rejected or subjected to a pay adjustment. The OWNER's risk is the probability that material produced at the rejectable quality level is accepted.

It is the intent of this section to inform the Contractor that, in order to consistently offset the Contractor's risk for material evaluated, production quality (using population average and population standard deviation) must be maintained at the acceptable quality specified or higher. In all cases, it is the responsibility of the Contractor to produce at quality levels that will meet the specified acceptance criteria when sampled and tested at the frequencies specified.

110-02 Method for Computing PWL. The computational sequence for computing PWL is as follows:

- a. Divide the lot into n sublots in accordance with the acceptance requirements of the specification.
- b. Locate the random sampling position within the subplot in accordance with the requirements of the specification.
- c. Make a measurement at each location, or take a test portion and make the

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measurement on the test portion in accordance with the testing requirements of the specification.

- d. Find the sample average ($\bar{X}$) for all subplot values within the lot by using the following formula:

$$\bar{X} = (x_1 + x_2 + x_3 + \dots + x_n) / n$$

Where: $\bar{X}$ = Sample average of all subplot values within a lot

x_1, x_2 = Individual subplot values

n = Number of sublots

- e. Find the sample standard deviation (S_n) by use of the following formula:

$$S_n = [(d_1^2 + d_2^2 + d_3^2 + \dots + d_n^2)/(n-1)]^{1/2}$$

Where: S_n = Sample standard deviation of the number of subplot values in the set
 d_1, d_2 = Deviations of the individual subplot values $x_1, x_2, \dots$ from the average value $\bar{X}$

that is: $d_1 = (x_1 - \bar{X}), d_2 = (x_2 - \bar{X}) \dots d_n = (x_n - \bar{X})$

n = Number of sublots

- f. For single sided specification limits (that is, L only), compute the Lower Quality Index Q_L by use of the following formula:

$$Q_L = (\bar{X} - L) / S_n$$

Where: L = specification lower tolerance limit

Estimate the percentage of material within limits (PWL) by entering Table 1 with Q_L , using the column appropriate to the total number (n) of measurements. If the value of Q_L falls between values shown on the table, use the next higher value of PWL.

- g. For double-sided specification limits (that is, L and U), compute the Quality Indexes Q_L and Q_U by use of the following formulas:

$$Q_L = (\bar{X} - L) / S_n$$

and

$$Q_U = (U - \bar{X}) / S_n$$

Where: L and U = specification lower and upper tolerance limits

Estimate the percentage of material between the lower (L) and upper (U) tolerance limits (PWL) by entering Table 1 separately with Q_L and Q_U , using the column appropriate to the total number (n) of measurements, and determining the percent of material above P_L and percent of material below P_U for each tolerance limit. If the values of Q_L fall between values shown on the table, use the next higher value of P_L or P_U . Determine the PWL by use

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of the following formula:

$$PWL = (P_U + P_L) - 100$$

Where: P_L = percent within lower specification limit
 P_U = percent within upper specification limit

EXAMPLE OF PWL CALCULATION

Project: Example Project

Test Item: Item P-401, Lot A.

A. PWL Determination for Mat Density.

1. Density of four random cores taken from Lot A.

$$A-1 = 96.60$$

$$A-2 = 97.55$$

$$A-3 = 99.30$$

$$A-4 = 98.35$$

$$n = 4$$

2. Calculate average density for the lot.

$$X = (x_1 + x_2 + x_3 + \dots + x_n) / n$$

$$X = (96.60 + 97.55 + 99.30 + 98.35) / 4$$

$$X = 97.95\% \text{ density}$$

3. Calculate the standard deviation for the lot.

$$S_n = [((96.60 - 97.95)^2 + (97.55 - 97.95)^2 + (99.30 - 97.95)^2 + (98.35 - 97.95)^2) / (4 - 1)]^{1/2}$$

$$S_n = [(1.82 + 0.16 + 1.82 + 0.16) / 3]^{1/2}$$

$$S_n = 1.15$$

4. Calculate the Lower Quality Index Q_L for the lot. ($L=96.3$)

$$Q_L = (X - L) / S_n$$

$$Q_L = (97.95 - 96.30) / 1.15$$

$$Q_L = 1.4348$$

5. Determine PWL by entering Table 1 with $Q_L = 1.44$ and $n = 4$.

$$PWL = 98$$

B. PWL Determination for Air Voids.

1. Air Voids of four random samples taken from Lot A.

$$A-1 = 5.00$$

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$$A-2 = 3.74$$

$$A-3 = 2.30$$

$$A-4 = 3.25$$

2. Calculate the average air voids for the lot.

$$X = (x_1 + x_2 + x_3 \dots n) / n$$

$$X = (5.00 + 3.74 + 2.30 + 3.25) / 4$$

$$X = 3.57\%$$

3. Calculate the standard deviation S_n for the lot.

$$S_n = [((3.57 - 5.00)^2 + (3.57 - 3.74)^2 + (3.57 - 2.30)^2 + (3.57 - 3.25)^2) / (4 - 1)]^{1/2}$$

$$S_n = [(2.04 + 0.03 + 1.62 + 0.10) / 3]^{1/2}$$

$$S_n = 1.12$$

4. Calculate the Lower Quality Index Q_L for the lot. ($L=2.0$)

$$Q_L = (X - L) / S_n$$

$$Q_L = (3.57 - 2.00) / 1.12$$

$$Q_L = 1.3992$$

5. Determine P_L by entering Table 1 with $Q_L = 1.41$ and $n = 4$.

$$P_L = 97$$

6. Calculate the Upper Quality Index Q_U for the lot. ($U=5.0$)

$$Q_U = (U - X) / S_n$$

$$Q_U = (5.00 - 3.57) / 1.12$$

$$Q_U = 1.2702$$

7. Determine P_U by entering Table 1 with $Q_U = 1.29$ and $n = 4$.

$$P_U = 93$$

8. Calculate Air Voids PWL

$$PWL = (P_L + P_U) - 100$$

$$PWL = (97 + 93) - 100 = 90$$

EXAMPLE OF OUTLIER CALCULATION (REFERENCE ASTM E178)

Project: Example Project

Test Item: Item P-401, Lot A.

A. Outlier Determination for Mat Density.

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1. Density of four random cores taken from Lot A arranged in descending order.
A-3 = 99.30
A-4 = 98.35
A-2 = 97.55
A-1 = 96.60
2. Use $n=4$ and upper 5% significance level of to find the critical value for test criterion = 1.463.
3. Use average density, standard deviation, and test criterion value to evaluate density measurements.
 - a. For measurements greater than the average:

If $(\text{measurement} - \text{average})/(\text{standard deviation})$ is less than test criterion, then the measurement is not considered an outlier

For A-3, check if $(99.30 - 97.95) / 1.15$ is greater than 1.463.
Since 1.174 is less than 1.463, the value is not an outlier.
 - b. For measurements less than the average:

If $(\text{average} - \text{measurement})/(\text{standard deviation})$ is less than test criterion, then the measurement is not considered an outlier.

For A-1, check if $(97.95 - 96.60) / 1.15$ is greater than 1.463.
Since 1.435 is less than 1.463, the value is not an outlier.

Note: In this example, a measurement would be considered an outlier if the density were:

Greater than $(97.95 + 1.463 \times 1.15) = 99.63\%$

OR

less than $(97.95 - 1.463 \times 1.15) = 96.27\%$.

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Table 1. Table for Estimating Percent of Lot Within Limits (PWL)

Percent Within Limits (P _L and P _U)	Positive Values of Q (Q _L and Q _U)							
	n=3	n=4	n=5	n=6	n=7	n=8	n=9	n=10
99	1.1541	1.4700	1.6714	1.8008	1.8888	1.9520	1.9994	2.0362
98	1.1524	1.4400	1.6016	1.6982	1.7612	1.8053	1.8379	1.8630
97	1.1496	1.4100	1.5427	1.6181	1.6661	1.6993	1.7235	1.7420
96	1.1456	1.3800	1.4897	1.5497	1.5871	1.6127	1.6313	1.6454
95	1.1405	1.3500	1.4407	1.4887	1.5181	1.5381	1.5525	1.5635
94	1.1342	1.3200	1.3946	1.4329	1.4561	1.4717	1.4829	1.4914
93	1.1269	1.2900	1.3508	1.3810	1.3991	1.4112	1.4199	1.4265
92	1.1184	1.2600	1.3088	1.3323	1.3461	1.3554	1.3620	1.3670
91	1.1089	1.2300	1.2683	1.2860	1.2964	1.3032	1.3081	1.3118
90	1.0982	1.2000	1.2290	1.2419	1.2492	1.2541	1.2576	1.2602
89	1.0864	1.1700	1.1909	1.1995	1.2043	1.2075	1.2098	1.2115
88	1.0736	1.1400	1.1537	1.1587	1.1613	1.1630	1.1643	1.1653
87	1.0597	1.1100	1.1173	1.1192	1.1199	1.1204	1.1208	1.1212
86	1.0448	1.0800	1.0817	1.0808	1.0800	1.0794	1.0791	1.0789
85	1.0288	1.0500	1.0467	1.0435	1.0413	1.0399	1.0389	1.0382
84	1.0119	1.0200	1.0124	1.0071	1.0037	1.0015	1.0000	0.9990
83	0.9939	0.9900	0.9785	0.9715	0.9671	0.9643	0.9624	0.9610
82	0.9749	0.9600	0.9452	0.9367	0.9315	0.9281	0.9258	0.9241
81	0.9550	0.9300	0.9123	0.9025	0.8966	0.8928	0.8901	0.8882
80	0.9342	0.9000	0.8799	0.8690	0.8625	0.8583	0.8554	0.8533
79	0.9124	0.8700	0.8478	0.8360	0.8291	0.8245	0.8214	0.8192
78	0.8897	0.8400	0.8160	0.8036	0.7962	0.7915	0.7882	0.7858
77	0.8662	0.8100	0.7846	0.7716	0.7640	0.7590	0.7556	0.7531
76	0.8417	0.7800	0.7535	0.7401	0.7322	0.7271	0.7236	0.7211
75	0.8165	0.7500	0.7226	0.7089	0.7009	0.6958	0.6922	0.6896

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Percent Within Limits (P_L and P_U)	Positive Values of Q (Q_L and Q_U)							
	n=3	n=4	n=5	n=6	n=7	n=8	n=9	n=10
74	0.7904	0.7200	0.6921	0.6781	0.6701	0.6649	0.6613	0.6587
73	0.7636	0.6900	0.6617	0.6477	0.6396	0.6344	0.6308	0.6282
72	0.7360	0.6600	0.6316	0.6176	0.6095	0.6044	0.6008	0.5982
71	0.7077	0.6300	0.6016	0.5878	0.5798	0.5747	0.5712	0.5686
70	0.6787	0.6000	0.5719	0.5582	0.5504	0.5454	0.5419	0.5394
69	0.6490	0.5700	0.5423	0.5290	0.5213	0.5164	0.5130	0.5105
68	0.6187	0.5400	0.5129	0.4999	0.4924	0.4877	0.4844	0.4820
67	0.5878	0.5100	0.4836	0.4710	0.4638	0.4592	0.4560	0.4537
66	0.5563	0.4800	0.4545	0.4424	0.4355	0.4310	0.4280	0.4257
65	0.5242	0.4500	0.4255	0.4139	0.4073	0.4030	0.4001	0.3980
64	0.4916	0.4200	0.3967	0.3856	0.3793	0.3753	0.3725	0.3705
63	0.4586	0.3900	0.3679	0.3575	0.3515	0.3477	0.3451	0.3432
62	0.4251	0.3600	0.3392	0.3295	0.3239	0.3203	0.3179	0.3161
61	0.3911	0.3300	0.3107	0.3016	0.2964	0.2931	0.2908	0.2892
60	0.3568	0.3000	0.2822	0.2738	0.2691	0.2660	0.2639	0.2624
59	0.3222	0.2700	0.2537	0.2461	0.2418	0.2391	0.2372	0.2358
58	0.2872	0.2400	0.2254	0.2186	0.2147	0.2122	0.2105	0.2093
57	0.2519	0.2100	0.1971	0.1911	0.1877	0.1855	0.1840	0.1829
56	0.2164	0.1800	0.1688	0.1636	0.1607	0.1588	0.1575	0.1566
55	0.1806	0.1500	0.1406	0.1363	0.1338	0.1322	0.1312	0.1304
54	0.1447	0.1200	0.1125	0.1090	0.1070	0.1057	0.1049	0.1042
53	0.1087	0.0900	0.0843	0.0817	0.0802	0.0793	0.0786	0.0781
52	0.0725	0.0600	0.0562	0.0544	0.0534	0.0528	0.0524	0.0521
51	0.0363	0.0300	0.0281	0.0272	0.0267	0.0264	0.0262	0.0260
50	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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Percent Within Limits (P _L and P _U)	Negative Values of Q (Q _L and Q _U)							
	n=3	n=4	n=5	n=6	n=7	n=8	n=9	n=10
49	-0.0363	-0.0300	-0.0281	-0.0272	-0.0267	-0.0264	-0.0262	-0.0260
48	-0.0725	-0.0600	-0.0562	-0.0544	-0.0534	-0.0528	-0.0524	-0.0521
47	-0.1087	-0.0900	-0.0843	-0.0817	-0.0802	-0.0793	-0.0786	-0.0781
46	-0.1447	-0.1200	-0.1125	-0.1090	-0.1070	-0.1057	-0.1049	-0.1042
45	-0.1806	-0.1500	-0.1406	-0.1363	-0.1338	-0.1322	-0.1312	-0.1304
44	-0.2164	-0.1800	-0.1688	-0.1636	-0.1607	-0.1588	-0.1575	-0.1566
43	-0.2519	-0.2100	-0.1971	-0.1911	-0.1877	-0.1855	-0.1840	-0.1829
42	-0.2872	-0.2400	-0.2254	-0.2186	-0.2147	-0.2122	-0.2105	-0.2093
41	-0.3222	-0.2700	-0.2537	-0.2461	-0.2418	-0.2391	-0.2372	-0.2358
40	-0.3568	-0.3000	-0.2822	-0.2738	-0.2691	-0.2660	-0.2639	-0.2624
39	-0.3911	-0.3300	-0.3107	-0.3016	-0.2964	-0.2931	-0.2908	-0.2892
38	-0.4251	-0.3600	-0.3392	-0.3295	-0.3239	-0.3203	-0.3179	-0.3161
37	-0.4586	-0.3900	-0.3679	-0.3575	-0.3515	-0.3477	-0.3451	-0.3432
36	-0.4916	-0.4200	-0.3967	-0.3856	-0.3793	-0.3753	-0.3725	-0.3705
35	-0.5242	-0.4500	-0.4255	-0.4139	-0.4073	-0.4030	-0.4001	-0.3980
34	-0.5563	-0.4800	-0.4545	-0.4424	-0.4355	-0.4310	-0.4280	-0.4257
33	-0.5878	-0.5100	-0.4836	-0.4710	-0.4638	-0.4592	-0.4560	-0.4537
32	-0.6187	-0.5400	-0.5129	-0.4999	-0.4924	-0.4877	-0.4844	-0.4820
31	-0.6490	-0.5700	-0.5423	-0.5290	-0.5213	-0.5164	-0.5130	-0.5105
30	-0.6787	-0.6000	-0.5719	-0.5582	-0.5504	-0.5454	-0.5419	-0.5394
29	-0.7077	-0.6300	-0.6016	-0.5878	-0.5798	-0.5747	-0.5712	-0.5686
28	-0.7360	-0.6600	-0.6316	-0.6176	-0.6095	-0.6044	-0.6008	-0.5982
27	-0.7636	-0.6900	-0.6617	-0.6477	-0.6396	-0.6344	-0.6308	-0.6282
26	-0.7904	-0.7200	-0.6921	-0.6781	-0.6701	-0.6649	-0.6613	-0.6587
25	-0.8165	-0.7500	-0.7226	-0.7089	-0.7009	-0.6958	-0.6922	-0.6896

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Percent Within Limits (P _L and P _U)	Negative Values of Q (Q _L and Q _U)							
	n=3	n=4	n=5	n=6	n=7	n=8	n=9	n=10
24	-0.8417	-0.7800	-0.7535	-0.7401	-0.7322	-0.7271	-0.7236	-0.7211
23	-0.8662	-0.8100	-0.7846	-0.7716	-0.7640	-0.7590	-0.7556	-0.7531
22	-0.8897	-0.8400	-0.8160	-0.8036	-0.7962	-0.7915	-0.7882	-0.7858
21	-0.9124	-0.8700	-0.8478	-0.8360	-0.8291	-0.8245	-0.8214	-0.8192
20	-0.9342	-0.9000	-0.8799	-0.8690	-0.8625	-0.8583	-0.8554	-0.8533
19	-0.9550	-0.9300	-0.9123	-0.9025	-0.8966	-0.8928	-0.8901	-0.8882
18	-0.9749	-0.9600	-0.9452	-0.9367	-0.9315	-0.9281	-0.9258	-0.9241
17	-0.9939	-0.9900	-0.9785	-0.9715	-0.9671	-0.9643	-0.9624	-0.9610
16	-1.0119	-1.0200	-1.0124	-1.0071	-1.0037	-1.0015	-1.0000	-0.9990
15	-1.0288	-1.0500	-1.0467	-1.0435	-1.0413	-1.0399	-1.0389	-1.0382
14	-1.0448	-1.0800	-1.0817	-1.0808	-1.0800	-1.0794	-1.0791	-1.0789
13	-1.0597	-1.1100	-1.1173	-1.1192	-1.1199	-1.1204	-1.1208	-1.1212
12	-1.0736	-1.1400	-1.1537	-1.1587	-1.1613	-1.1630	-1.1643	-1.1653
11	-1.0864	-1.1700	-1.1909	-1.1995	-1.2043	-1.2075	-1.2098	-1.2115
10	-1.0982	-1.2000	-1.2290	-1.2419	-1.2492	-1.2541	-1.2576	-1.2602
9	-1.1089	-1.2300	-1.2683	-1.2860	-1.2964	-1.3032	-1.3081	-1.3118
8	-1.1184	-1.2600	-1.3088	-1.3323	-1.3461	-1.3554	-1.3620	-1.3670
7	-1.1269	-1.2900	-1.3508	-1.3810	-1.3991	-1.4112	-1.4199	-1.4265
6	-1.1342	-1.3200	-1.3946	-1.4329	-1.4561	-1.4717	-1.4829	-1.4914
5	-1.1405	-1.3500	-1.4407	-1.4887	-1.5181	-1.5381	-1.5525	-1.5635
4	-1.1456	-1.3800	-1.4897	-1.5497	-1.5871	-1.6127	-1.6313	-1.6454
3	-1.1496	-1.4100	-1.5427	-1.6181	-1.6661	-1.6993	-1.7235	-1.7420
2	-1.1524	-1.4400	-1.6016	-1.6982	-1.7612	-1.8053	-1.8379	-1.8630
1	-1.1541	-1.4700	-1.6714	-1.8008	-1.8888	-1.9520	-1.9994	-2.0362

END OF SECTION 110

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SUPPLEMENTAL GENERAL PROVISIONS

(City of Fayetteville Requirements)

1. DEFINITION OF TERMS

Whenever in these specifications and contract the following terms, or pronouns in place of them, are used, the intent and meaning shall be interpreted as follows:

1. City/Owner - The City of Fayetteville, North Carolina
2. City Council - The Mayor - City Council of the City of Fayetteville, NC
3. City Attorney - The legal counsel employed by the City.
4. Contracting Officer - The City representative; acting directly or through an assistant fully authorized to handle the administration of all City Contracts.
5. Engineer – The Engineer and/or Architect consultant representative for the City fully authorized to provide general administration of the performance of construction contracts, including liaison and necessary observation of the work.

2. CONTRACT BONDS REQUIRED

The successful bidder, at the time of the execution of the contract shall provide the City with a contract payment bond and a contract performance bond that shall be in compliance with N.C.G.S. Chapter 44A, Article 3, as follows:

(a) A performance bond in the amount of one hundred percent (100%) of the construction contract amount, conditioned upon the faithful performance of the contract in accordance with the plans, specifications, and conditions of the contract shall be provided. Such bonds shall be solely for the protection of the City of Fayetteville.

(b) A laborer and materials payment bond in the amount of one hundred percent (100%) of the construction contract amount, conditioned upon the prompt payment for all labor or materials for which a Contractor or subcontractor is liable shall be provided. The payment bond shall be solely for the protection of the persons furnishing materials or performing labor for which the Contractor or subcontractor is liable.

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The corporate surety furnishing the bonds shall be authorized to do business in the State of North Carolina, and shall be acceptable to the City Attorney. All contract payment bonds and contract performance bonds shall be executed on "Performance Bond" and "Payment Bond" forms provided in the "Contract Award Package" and be countersigned by a regularly authorized agent of the corporate surety who is resident in North Carolina and who is licensed by the North Carolina Department of Insurance.

3. INSURANCE

The Contractor shall not commence work under this Contract until he has obtained all insurance required under this paragraph, and such insurance has been approved by the City Attorney, nor shall the Contractor allow any subcontractor to commence work on his subcontract until all similar insurance has been so obtained and approved. See Other Provisions Section (2) (c) below titled "Subcontractors."

The insurance required for this contract is as follows:

- (a) Commercial General Liability ISO #CG 00 01 10 93: The Contractor shall take out and maintain during the life of this contract commercial general liability insurance with limits of \$5,000,000 per occurrence; \$5,000,000 aggregate other than products/completed operations; \$5,000,000 aggregate for products/completed.
- (b) Automobile Liability ISO #CA 00 01 12 93: The Contractor shall take out and maintain during the life of this contract automobile liability insurance in an amount not less than \$5,000,000 combined single limit per accident for bodily injury and property damage from owned, non-owned, and hired automobiles.
- (c) Workers' Compensation and Employers' Liability Insurance: The Contractor shall take out and maintain during the life of this contract workers' compensation insurance as required by the laws of the State of North Carolina and Employers' Liability with limits of \$100,000 each accident, \$500,000 policy limit and \$100,000 each employee for all employees employed on the project. In case any employee(s) engaged in work under this contract is or are not protected under the Workers' Compensation Statute, the Contractor shall provide adequate coverage for the protection of employees not otherwise protected.
- (d) Property Insurance: If contracted to construct a building, the Contractor shall purchase and maintain "Builder's Risk" insurance. This insurance shall include the interests of the City, the Contractor and Subcontractors

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and shall be written on a one hundred percent (100%) completed value basis (full value as of the date that all construction is finished and includes the Contractor's total cost plus profit), and to remain in force until the project is completed and accepted by the City.

Regardless of the nature of the work to be performed, coverage must also be provided for the theft or damage of building materials and supplies, which are not permanently attached and stored on site for any period of time. This coverage shall be an "Installation Floater," and where no building construction is involved, the amount of the coverage shall equal the value of the materials stored on site.

It is the responsibility of the Contractor to inform the policy provider of any and all change orders which increase the building's value. Any penalties or losses incurred due to the Contractor's failure to adequately insure the building during construction will be the Contractor's responsibility.

- (e) Owner's and Contractor's Protective Liability I.S.O.#CG 00 09 10 93: The Contractor shall secure and maintain during the life of the contract, an Owner's and Contractor's Protective Liability insurance policy for the City, with minimum limits of \$1,000,000 per occurrence/\$2,000,000 aggregate.

Acceptability of Insurance

All insurance policies shall be written by insurers licensed to do business in North Carolina. It is realized that certain business activities may not be readily insurable by admitted carriers. If insurance is written by non-admitted carriers whose names appear on the current listing of approved and non-admitted carriers prepared by the North Carolina Department of Insurance, such carriers will be favorably considered assuming they meet all other requirements. Non-admitted carriers should be so identified on the Certificate of Insurance form. The City reserves the right to reject any and all certificates or policies issued by insurers with a Best's rating less than A;VII.

Indemnity Provision

Contractor assumes entire responsibility and liability for losses, expenses, demands and claims in connection with or arising out of any injury, or alleged injury (including death) to any person, or damage, or alleged damage, to property of the City of Fayetteville or others sustained or alleged to have been sustained in connection with or to have arisen out of or resulting from the negligence of the Contractor, his subcontractors, agents, and employees, in the performance of the work/service set forth in the Standard Specifications and Special Provisions, and any changes, addenda, or modifications including losses, expenses or damages

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sustained by the City of Fayetteville, and agrees to indemnify and hold harmless the City of Fayetteville, its officials, employees, agents or volunteers from any and all such losses, expenses, damages, demands and claims and agrees to defend any suit or action brought against them, or any of them, based on any such alleged injury or damage, and to pay all damages, cost and expenses in connection therewith or resulting therefrom. As an integral part of this agreement Contractor agrees to purchase and maintain during the life of this contract contractual liability insurance in the amount required in the general liability insurance requirements and to furnish proper evidence thereof.

Other Provisions:

- (1) Any deductible or self-insured retention must be declared to and approved by the City.
- (2) The policies are to contain, or be endorsed to contain, the following provisions:
 - (a) Commercial General Liability Coverage
 - 1) The City of Fayetteville, its officials, employees and volunteers are to be covered as additional insured as respects: liability arising out of activities performed by or on behalf of the Contractor; products and completed operations of the Contractor; premises owned, leased or used by the Contractor; or automobiles owned, leased, hired or borrowed by the Contractor. The coverage shall contain no special limitations on the scope of protection afforded to the City, its officials, employees or volunteers.
 - 2) The Contractor's insurance coverage shall be primary insurance as respects the City, its officials, employees and volunteers. Any insurance or self-insurance maintained by the City, its officials, employees or volunteers shall be excess of Contractor's insurance and shall not contribute with it.
 - 3) Coverage shall state that Contractor's insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.
 - (b) All Coverages

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Each insurance policy required by this clause shall be endorsed to state that coverage shall not be suspended, voided, canceled by either party, reduced in coverage or in limits except after thirty (30) days prior written notice by certified mail, return receipt requested, has been given to:

City of Fayetteville Purchasing Office
433 Hay Street
Fayetteville, NC 28301

Any failure to comply with reporting provisions of the policies shall not affect coverage provided to the City, its officials, employees, and volunteers. In the event the City is damaged by the failure of the Contractor to maintain such insurance and to so notify the City, the Contractor shall bear all reasonable costs properly attributable thereto.

(c) **Subcontractors**

Contractor shall include all subcontractors as insurers under its policies OR shall furnish separate certificates and endorsements for each subcontractor. All coverages for subcontractors shall be subject to all of the requirements stated herein.

(d) **No Waiver of Immunity**

Any insurance coverage required by the terms of this contract shall not be deemed a contract of insurance purchased by the City nor a waiver of the City's immunity pursuant to NCGS 160A-485.

4. SUBLETTING OR ASSIGNING OF CONTRACT

The Contractor shall not sublet, sell, transfer, assign, or otherwise dispose of the contract or any portion thereof, or of the work provided for therein, or his right, title or interest therein to any person, firm, partnership, or corporation without the written consent of the City Council. Except as may be required under the terms of the Performance Bond or Payment Bond, no funds or sums of money due the Contractor under the contract may be assigned.

5. INTENT OF PLANS AND SPECIFICATIONS

The drawings and specifications are complementary, one to the other. That which is shown on the drawings or called for in the specifications shall be as binding as if it were both called for and shown. The intent of the drawings and specifications

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is to establish the scope of all labor, materials, transportation, equipment, and any and all other things necessary to provide a complete job.

The wording of the specifications shall be interpreted in accordance with common usage of the language except that words having a commonly used technical or trade meaning shall be so interpreted in preference to other meanings.

6. ENGINEER STATUS

The City's Engineer (or Architect) representative will provide general administration of the performance of construction contracts, including liaison and necessary observation of the work. The Engineer will endeavor to protect the interests of the Owner such that the project is completed in general conformance with the design intent as depicted in the plans and specifications. He is the agent of the City only for the purpose of the construction of this work and to the extent stipulated in the contract documents. He has authority to stop work or to order work removed, or to order corrections of faulty work where such action may be necessary to assure successful completion of the work.

The Engineer will coordinate inspections and tests of the work at intervals appropriate to the stage of construction and the Contractor will be responsible for notifying the Engineer in advance when any work will be ready for testing. The Engineer will observe the progress, the quality and the quantity of the work.

7. PLANS AND WORKING DRAWINGS

The Engineer will furnish drawings necessary to show the line, grade, and details of all construction work to be done under this contract. The locations of underground utility lines are depicted on the plans to the extent known to the Engineer, but the exact locations, sizes, nature and extent of such lines cannot be guaranteed. Additional utilities may also be present. It will be the responsibility of the Contractor to protect all utility lines against damages at all time. Any deviation from the plans, specifications, etc., as may be required by the exigencies of the construction, in all cases will be determined by the Engineer. The Engineer reserves the right to make such alterations in the plans or in the character of the work, from time to time, as may be considered necessary or desirable to complete fully the construction of the work, and if such alterations of the plans result in increased cost or result in decreased cost to the Contractor, an equitable adjustment therefore is to be agreed upon by Change Order.

8. CLARIFICATIONS AND DETAIL

In such cases where the nature of the work requires clarification by the Engineer, such clarification shall be furnished by the Engineer with reasonable promptness by means of written instructions or detail drawings, or both. Clarifications and drawings shall be consistent with the intent of contract documents, and shall

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become a part thereof. The Contractor shall not proceed with the work without such detail drawings and/or written clarifications.

9. SHOP DRAWINGS, SUBMITTALS, SAMPLES, DATA

The Contractor shall submit to the Engineer electronic copies by e-mail all shop or setting drawings, descriptive data, samples, color charts, etc., required for the work. Samples, color charts, etc. may be requested as actual products or printed cards for selection. All shop submittals shall first be reviewed and stamped by the Contractor. Any deviations from specification requirements shall be clearly noted on the Contractor's transmittal. Each submittal shall be keyed to the specification section(s) and/or plan sheets associated with the item. The Engineer will review the shop submittals promptly, noting desired corrections, if any, and will endeavor to return copies electronically to the Contractor within 14 calendar days after receipt from the Contractor. The Contractor shall furnish revised submittals to the Engineer if so indicated.

The Engineer reserves the right to review only those shop submittals specifically required by the contract documents or as directed. Other submittals may be reviewed, returned without action or entered into the project record without review action, as the Engineer deems appropriate.

Shop submittals shall not represent a forum for material substitution. The Contractor shall include in any substitution request a statement agreeing to reimburse the Engineer for design team costs incurred in reviewing the substitution request.

Review of shop submittals by the Engineer will be for general conformance with the design intent and shall not be construed as relieving the Contractor from responsibility for compliance with the design or terms of the contract documents nor from responsibility for errors of any sort in the shop drawings.

10. INSPECTION OF THE WORK

It is a condition of this contract that the work shall be subject to observation and inspection during normal working hours by the Engineer, designated official representatives of the City, and those persons required by State law or local ordinance to test special work for official approval. The Contractor shall therefore provide safe access to the work at all times for such inspections.

Inspection shall consist of visual observations of materials, equipment and construction work for the purpose of ascertaining that the work is in conformance with the contract documents. Such inspection shall not be relied upon by the Contractor as acceptance of the work, nor should it be construed to relieve the Contractor in any way from the obligation and responsibilities the Contractor

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assumes under the construction contract. Specifically, but without limitation, inspection by the Engineer or designated official representatives shall not require the Engineer or designated official representatives to assume responsibilities for the means and methods of construction, nor for safety on the job site.

Where special inspection or testing is required by State laws or local ordinances, instructions of the Engineer, specification or codes, the Contractor shall give adequate notice to the Engineer of the time set for such inspection or test, if the inspection or test will be conducted by a party other than the Engineer. Such special tests or inspections will be made in the presence of the Engineer, or his authorized representative, and it shall be the Contractor's responsibility to serve ample notice of such tests.

Should any work be covered up or concealed prior to inspection and approval by the Engineer, such work shall be uncovered or exposed for inspection if so requested by the Engineer in writing. Inspection of the work will be made promptly upon notice from the Contractor. All cost involved in uncovering, repairing, replacing, recovering, and restoring to design condition, the work that has been covered or concealed shall be paid by the Contractor.

11. TESTING

The City reserves the right to test any or all materials and workmanship through a certified independent testing laboratory at City expense. Testing shall be accomplished as deemed necessary by the Engineer. Any necessary re-testing due to failures of previous tests shall be at the Contractor's expense.

12. USE OF A SECTION OF THE WORK

Whenever in the opinion of the Engineer any portion of the work is completed or is in acceptable condition for use, it shall be used for the purpose it was intended as may be directed, and such use shall not be held to be in any way acceptance of that portion of the work used or as a waiver of any of these specifications and contract. Necessary repairs or renewals made in any section of the work, due to defective materials, or work, or natural causes, shall be performed at the expense of the Contractor.

13. PROSECUTION OF WORK

The Contractor shall begin the work to be performed under the contract within ten (10) days after such date as the Contracting Officer or Engineer shall notify him to proceed. Commencement of work by the Contractor shall be deemed and taken as a waiver of this notice on his part. The Contractor will be required to prosecute the work in a continuous and uninterrupted manner from the time he begins the work until completion and final acceptance of the project. The Contractor is not permitted to suspend his operation except for reasons beyond his control and/or

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where the Engineer has authorized a suspension of the work in writing. The City will not be liable for delays of any nature providing the work is progressing satisfactorily to ensure its completion within the time set forth in the contract. Should prosecution of the work for either above reason be discontinued by the Contractor, he shall notify the Engineer at least twenty-four (24) hours before again resuming operations.

In the event that the Contractor's operations are suspended in violation of these provisions, liquidated damages will be charged to the Contractor for each and every calendar day that such suspension takes place. These damages will be additional to any damages that may become chargeable due to failure to complete the work on time. The Contractor hereby agrees by executing the contract that such liquidated damages are considered a just and reasonable compensation to the City.

14. CITY'S RIGHT TO DO WORK

If, during the progress of the work or during the period of guarantee, the Contractor fails to prosecute the work properly or to perform any provision of the contract, the City, after fifteen (15) days written notice sent by certified mail return receipt requested to the Contractor from the Engineer, may perform or have performed that portion of the work. The cost of the work may be deducted from any amounts due or to become due to the Contractor, such action and cost of same having been first approved by the Engineer. Should the cost of such action of the City exceed the amount due or to become due the Contractor, then the Contractor or his surety, or both, shall be liable for and shall pay to the City the amount of said excess.

15. CHANGE ORDERS

The City may have changes made in the work covered by the contract. These changes will not invalidate and will not relieve or release the Contractor from any guarantee given by him pertinent to the contract provisions. These changes will not affect the validity of the guarantee bond and will not relieve the surety or sureties of said bond. All extra work shall be executed under conditions of the original contract.

Except in an emergency endangering life or property, no changes shall be made by the Contractor except upon written order from the Contracting Officer, Countersigned by the Assistant City Manager authorizing such change, and no claim for adjustments of the contract price shall be valid unless this procedure is followed.

At the time of signing a change order, the Contractor shall be required to certify as follows:

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"I certify that my Bonding Company will be notified forth-with that my contract has been changed by the amount of this change order, and that a copy of the approved change order will be mailed upon receipt by me to my surety."

A change order, when issued, shall be full compensation, or credit, for the extra work included, omitted, or substituted. It shall show on its face the adjustment in time for completion of the project as a result of the change in the work.

If, during the progress of the work, the City requests a change order and the Contractor's terms are unacceptable, the City without prejudice, with the approval of the City Purchasing Division, may perform or have performed that portion of the work requested in the change order.

16. DISCOVERY OF DEFECTS

The City reserves the right, should an error be discovered in the estimate or conclusive proof of defective work or materials used by or on the part of the Contractor be discovered either before or after the final payment has been made, to claim and remove by process of law such sum or sums as may be sufficient to correct the error or make good the defects in the work and materials.

17. SCOPE OF PAYMENTS

The Contractor shall receive and accept the compensation as herein provided in full payment for:

- (1) Furnishing all materials, labor, tools, and equipment and for performing all work contemplated and embraced under the contract.
- (2) All loss or damages arising out of the nature of the work or from the action of the elements or from any unforeseen difficulties or obstruction which may arise or be encountered during the prosecution of the work, until its final acceptance.
- (3) All risks of every description connected with the prosecution of the work.
- (4) All expenses incurred by, or in consequence of, the suspension or discontinuance of the said prosecution of the work herein specified.
- (5) Completing the project and the whole thereof in an acceptable manner according to the plans and specifications.

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18. REQUEST AND CERTIFICATES FOR PAYMENT

Not later than the tenth day of the month, the Contractor shall submit to the Engineer a request for payment for work done during the previous month. The request shall be in the form agreed upon between the Contractor and the Engineer, but shall show substantially the value of work done and materials delivered to the site during the period since the last payment, and shall sum up the financial status of the contract.

The Contractor shall coordinate with the RPR as to work quantities and completion status in preparing the pay requests. The pay requests are to be signed by the RPR prior to delivery to the Engineers Project Manager.

The making and acceptance of payment by the City shall not constitute an acceptance of the work or any part thereof.

19. PAYMENTS

Payments will be made monthly on a Net 30 day basis as follows:

- (1) Partial payments for mobilization will be made on the first and second payments. Up to 2 ½ percent of the value of the contract will be paid on each of these partial payments. Any excess (amount over 5 percent of the value of the contract) will be paid on the final payment.
- (2) Amount to be paid monthly is amount of work completed monthly less 5% percent retainage, in accordance with FAA standards.
- (3) The City reserves the right to hold a greater amount of retainage, for unsatisfactory job progress, defective construction not remedied, disputed work, or third-party claims filed against the City or reasonable evidence that a third-party claim will be filed.

20. ESTIMATED QUANTITIES

The estimated quantities contained for certain items in the proposal are for the purpose of comparing bids. Such quantities are not guaranteed, and settlement will be made on the basis of the work as actually executed at the unit price in the proposal as accepted. Any variation is understood to be in the total amount of the contract and each item need not necessarily be varied the same amount.

21. VARIATION IN ESTIMATED QUANTITY

Variations between estimated and final quantities will be handled as set forth in Section 40 and Section 90 of the General Conditions.

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22. SALES TAX CERTIFICATE

The Contractor is to complete City forms certifying sales tax paid, on all materials used in construction. The Contractor may use his own computer forms as long as the form supplies all information requested by the City certificate. The certificate shall be furnished with each pay request, regardless of amount, and list taxes for all items included in the pay request. In the event the pay request does not include any taxable items, the certificate is still required and must certify this fact. Pay requests without the required certificate may be denied approval (and thus payment) until the certificate is provided.

23. CLAIMS FOR EXTRA COST

The Contractor shall not act on instructions received by him from persons other than the Engineer, Contracting Officer or any designated representative, and any claims for extra compensation or extension of time on account of unauthorized instruction will not be honored. The City will not be responsible for misunderstandings claimed by the Contractor of verbal instructions which have not been confirmed in writing, and in no case shall instructions be interpreted as permitting a departure from the contract documents unless such instruction is confirmed in writing and supported by a properly authorized change order.

24. DISPUTES

To prevent disputes and litigation or claims, the Contracting Officer shall in all cases be the point of contact and shall act as negotiator to resolve any questions concerning the performance of work or amounts to be paid under this contract. The Contracting Officer in conjunction with the Engineer will strive to resolve any questions or claims concerning the performance of the contract. All decisions shall be final and conclusive except as allowed as follows. All claims, disputes and other matters in question arising out of, or relating to, this contract not resolved by the aforementioned negotiation shall be resolved by legal action instituted and tried in the General Courts of North Carolina under North Carolina law with venue for trial being Cumberland County.

25. PAYMENTS WITHHELD

- a. The Contracting Official with the approval of the City may withhold payment for the following reasons:
 1. Faulty work not corrected.
 2. The unpaid balance on the contract is insufficient to complete the work in the judgment of the Engineer.

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3. To provide for sufficient contract balance to cover liquidated damages that will be assessed.
 4. Claims filed against the Contractor or evidence that a claim will be filed.
 5. Evidence that subcontractors have not been paid.
- b. When grounds for withholding payments have been removed, payment will be released.

26. FINAL INSPECTION

The Engineer shall make final inspection of the project within fourteen (14) days after receipt of a written notice from the Contractor of the final completion and cleaning up of the work covered by the contract.

27. CORRECTION OF WORK BEFORE FINAL PAYMENT

- a. Any work, materials, fabricated items, or other parts of the work which have been condemned or declared not in accordance with the contract by the Engineer shall be promptly removed from the work site by the Contractor, and shall be immediately replaced by new work in accordance with the contract at no additional cost to the City. Work or property of other Contractors or the City, damaged or destroyed by virtue of such faulty work, shall be made good at the expense of the Contractor whose work is faulty.
- b. Correction of condemned work described above shall commence within twenty-four (24) hours after receipt of notice from the Engineer, and shall make satisfactory progress until completed.
- c. Should the Contractor fail to proceed with the required corrections, then the City may complete the work in accordance with the provisions (City's Right to Do Work).

28. ACCEPTANCE AND FINAL PAYMENT

When the Contractor has completed the work in an acceptable manner in accordance with the terms of the contract, the Project Engineer shall make a final inspection for acceptance of work by the City.

The making and acceptance of final payment shall constitute a waiver of all claims by the Contractor except those claims previously made and remaining unsettled.

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Final certificate of payment shall be accompanied by the following:

1. Warranties and guarantees required by the contract.
2. Release and Waiver of Claim for Prime Contractors.
3. Affidavit of Contractors of payment to material suppliers and subcontractors.
4. Consent of Surety to final payment.
5. Return of all Contractor issued SIDA Badges to the Airport Manager's Office.
6. Final acceptance by the Engineer of all punch list work to be performed by the Contractor.
7. Issuance of final Certificate of Occupancy from the City.

29. CORRECTION OF WORK AFTER FINAL PAYMENT

Neither the final certificate, final payment, occupancy of the premises by the City, nor any provision of the contract, nor any other act or instrument of the City, nor the Engineer, shall relieve the Contractor from responsibility for negligence, or faulty material or workmanship, or failure to comply with the drawings and specifications. He shall correct or make good any defects due thereto and repair any damage resulting therefrom which may appear during the guarantee period following final acceptance of the work except as stated otherwise under Article Guarantee. The City or Engineer will report any defects as they may appear to the Contractor and establish a time limit from completion of corrections by the Contractor. The City will be the judge as to the responsibility for correction of defects.

30. TERMINATION OF CONTRACT

The contract shall be considered complete when all work has been completed and accepted by the Owner.

31. CONTRACT TERMINATION FOR CONVENIENCE

If the City shall determine that it is in the City's best interest, the City shall notify the Contractor to terminate the work within seven (7) days. In such event, the Contractor shall be entitled to compensation for all work properly executed and any expenses incurred in terminating the contract and vacating the construction site. No claim shall be made by the Contractor for any loss of anticipated profits because of any alteration, change or termination, or by reason of any variation between the approximate quantities and the quantity of work as done.

32. GENERAL STATUTES GUIDELINES

All Prospective Bidders are Hereby Advised to Become Familiar with Certain Provisions of the General Statutes of North Carolina. The following list is

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furnished for your information and is not meant to be all-inclusive. Full compliance of the Current General Statutes of North Carolina applicable to this contract shall be required from all bidders.

Chapter 44A, Article 3	Payment and Performance Bonds.
Chapter 87	Contractors.
Chapter 95, Article 16	Occupational Safety and Health Act of North Carolina
Chapter 113A, Article 1	Pollution Control and Environment.
Chapter 130A, Article 19	Asbestos Hazard Management.
Chapter 132	Public Records.
Chapter 133, Article 1	Public Works - General.
Chapter 133, Article 3	Public Works - Regulation of Contractors.
Chapter 143, Article 8	Public Contracts.
Chapter 143, Article 21	Water and Air Resources.
Chapter 143, Article 21B	Air Pollution Control.

33. RESPONSIBILITY FOR THE WORK

Until the final acceptance of the project by the Owner, it shall be under the charge and care of the Contractor, and he shall take every precaution against injury or damage to same or any part thereof by the action of the elements or from any other cause whatever, whether arising from the execution of or the non-execution of the work. The Contractor will be held responsible for the protection and restoration, at his expense, of property monuments or markers, buildings, fences and all utility installations affected in the prosecution of the work.

34. CONSTRUCTION SUPERVISION

Throughout the progress of the work, the Contractor shall keep on the job a competent superintendent or supervisory staff satisfactory to the Engineer. The superintendent shall not be changed without the consent of the Engineer unless said superintendent ceases to be employed by the Contractor or ceases to be competent. The superintendent shall have authority to act on behalf of the

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Contractor, and instructions, directions or notices given to him shall be as binding as if given to the Contractor. However, important directions, instructions, and notices will be confirmed in writing to the Contractor, as will all such items if requested by the Contractor. Construction will be stopped if the Contractor's Superintendent is not available.

35. USE OF PREMISES

The Contractor(s) shall confine his apparatus, the storage of materials and the operations of his workmen to limits indicated by law, ordinances, permits, or directions of the Engineer and shall not exceed those established limits in his operations.

The Contractor(s) shall not load or permit any part of the structure to be loaded with a weight that will endanger its safety.

The Contractor(s) shall enforce the Engineer's instructions regarding signs, advertisements, fires, smoking or any other written instructions given.

36. EQUIPMENT, MATERIALS, WORKMANSHIP

The Contractor shall, unless otherwise specified, supply and pay for all labor, transportation, materials, tools, apparatus, lights, power, heat, sanitary facilities, water, scaffolding, and incidentals necessary for the completion of his work, and shall install, maintain and remove all equipment of the construction, other utensils or incidentals, and be responsible for the safe, proper and lawful construction, maintenance and use of same, and shall construct in the best and most workmanlike manner, a complete job and everything incidental thereto, as shown on the plans, stated in the specifications, or reasonably implied therefrom, all in accordance with the contract documents.

The Contractor shall furnish such equipment as is considered necessary by the Engineer for the prosecution of the work in an acceptable manner and at a satisfactory rate of progress. Equipment used on any portion of the work shall be such that no injury to adjacent work or property will result from its use.

Whenever products, materials, or equipment are named in the specifications, the specifications shall be interpreted to mean an item of material or equipment similar to that named and which is suited for the same use and capable of performing the same function as that named.

All materials shall be new and of quality specified, except where reclaimed material is authorized herein and approved for use. Upon notice, the Contractor shall furnish evidence as to quality of materials.

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Workmanship shall at all times be of a grade accepted as the best practice of the particular trade involved, and as stipulated in written standards, laws, rules, codes or regulations of recognized organizations or institutes of the respective trades except as exceeded or qualified by the specifications.

All work under this contract shall be performed in a skillful and workmanlike manner. The City may require, in writing, at any time during the construction and completion of the work covered by these contract documents, the removal of any employee of, or person connected with, the Contractor who shall use profane or abusive language to the inspector or other employees of the City, or otherwise interfere with him in the performance of his duties, or who shall disobey or evade instructions or who is careless, incompetent, or considered a nuisance or detriment to the work. The Contractor shall order such parties removed immediately from the grounds and shall not allow their return except by consent of the Contracting Officer.

37. INDEMNIFICATION

To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the City, the Engineer and other authorized representatives, consultants, and employees of the City, from and against all claims, damages, losses and expenses, including, but not limited to, attorneys' fees, arising out of or resulting from the performance or failure of performance of the work, provided that any such claim, damage, loss or expense (1) is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the work itself) including the loss of use resulting therefrom, and (2) is caused in whole or in part by any negligent act or omission of the Contractor, the Contractor's subcontractor, or the agents of either the Contractor or the Contractor's subcontractor. Such obligation shall not be construed to negate, abridge, or otherwise reduce any other right or obligation of indemnity which would otherwise exist as to any party or person described in this Article.

38. EQUAL OPPORTUNITY CLAUSE

The non-discrimination clause contained in Appendix D relative to Equal Employment Opportunity for all persons without regard to race, color, religion, sex or national origin, and the implementing rules and regulations prescribed by the Secretary of Labor, are incorporated herein.

39. EMPLOYMENT OF THE HANDICAPPED

The Contractors agree not to discriminate against any employee or applicant for employment because of physical or mental handicap in regard to any position for which the employee or applicant is qualified. The Contractor agrees to take affirmative action to employ, advance in employment and otherwise treat

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qualified handicapped individuals without discrimination based upon their physical or mental handicap in all employment practices.

40. SUBCONTRACTS AND SUBCONTRACTORS

The Contractor shall submit to the Engineer and the City, a list giving the names and addresses of subcontractors and equipment and material suppliers he proposes to use, together with the scope of their respective parts of the work.

The Contractor is and remains fully responsible for his own acts or omissions as well as those of any subcontractor or of any employee of either. The Contractor agrees that no contractual relationship exists between the subcontractor and the City in regard to the contract, and that the subcontractor acts on this work as an agent or employee of the Contractor.

41. CONTRACTORS AND SUBCONTRACTOR RELATIONSHIPS

The Contractor agrees that the terms and conditions of these contract documents shall apply equally to each subcontractor as to the Contractor, and the Contractor agrees to take such action as may be necessary to bind each subcontractor to these terms. The Contractor further agrees to conform to the "Code of Ethical Conduct" as adopted by the Associated General Contractors of America, Inc., with respect to Contractor-subcontractor relationships, and that payments to subcontractors shall be made in accordance with the provisions of G.S. 143-134.1 entitled, Interest on final payments due to prime contractors: payments to subcontractors.

42. CODES AND STANDARDS

Wherever reference is given to codes, standard specifications or other data published by regulating agencies including, but not limited to, National Electrical Codes, North Carolina State Building Codes, Federal Specifications, ASTM Specifications, various institute Specifications, etc., it shall be understood that such reference is to the latest edition including addenda published prior to the date of the contract documents.

43. OBSERVANCE OF LAWS

The Contractor at all times shall observe, conform to, and comply with all laws, regulations, and ordinances of the United States, the State of North Carolina, County of Cumberland and the City of Fayetteville, and shall indemnify and save harmless the City and all of its officers, agents, and employees against any claim or liability arising from or based on the violation of any such law or regulation, order, or decree, whether by himself or his employees.

If the Contractor observes that the drawings and specifications are at variance therewith, he shall promptly notify the Engineer in writing. Additional requirements or changes implemented after contract award will be subject to

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equitable negotiations and shall be made by change order. If the Contractor performs any work knowing it to be contrary to such laws, ordinances, codes, rules and regulations, and without such notice to the Engineer, he shall bear all cost arising therefrom.

44. TRUCK ROUTE ORDINANCE

The Contractor shall comply with the City's Truck Route Ordinance, Sec. 200-60; 20-61; 20-64; and 20-65. The Contractor shall make a thorough examination of the individual streets and establish all haul routes to comply with the Truck Route Ordinance. City of Fayetteville truck route maps are available upon request.

45. SEDIMENTATION POLLUTION CONTROL ACT OF 1973

Any land-disturbing activity performed by the Contractor(s) in connection with the project shall comply with all erosion control measures set forth in the contract documents and any additional measures which may be required in order to ensure that the project is in full compliance with the Sedimentation Pollution Control Act of 1973, as implemented by Title 15, North Carolina Administrative Code, Chapter 4, Sedimentation Control, Subchapters 4A, 4B and 4C, as amended (15 NCAC 4A, 4B, and 4C).

Upon receipt of notice that a land-disturbing activity is in violation of said Act, the Contractor(s) shall be responsible for insuring that all steps or actions necessary to bring the project in compliance with said Act are promptly taken.

To the fullest extent permitted by law, the Contractor(s) shall indemnify and hold harmless the City and agents, consultants and employees of the City, from and against all claims, damages, civil penalties, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from the performance of work or failure of performance of work, provided that any such claim, damage, civil penalty, loss or expense is attributable to a violation of the Sedimentation Pollution Control Act. Such obligation shall not be construed to negate, abridge or otherwise reduce any other right or obligation of indemnity which would otherwise exist as to any party or persons described in this Article.

46. PERMITS/LICENSES/NOTICES

The Contractor shall procure and bear the costs of all permits, licenses, fees, and inspections, and give all notices necessary and incidental to the due and lawful prosecution of the work.

47. HAZARDOUS MATERIALS

If the Contractor encounters any materials considered or suspected of being hazardous beyond that indicated in the Hazardous Materials Survey, he shall

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immediately secure the area and contact the City of Fayetteville, Engineering Department, (phone: 433-1656) for further instructions.

48. TRAFFIC

The Contractor will be required to maintain traffic within the limits of this project, including all existing roadways which cross or intersect unless otherwise provided in the contract or approved by the Project Engineer. The Contractor shall provide continuous safe vehicle and pedestrian access (which may include temporary bridges and their maintenance) to all properties, both public and private, and shall conduct his operations in such a manner that inconvenience to the public will be held to a minimum.

The Contractor shall utilize complete and proper traffic controls and traffic control devices during all operations. All traffic control devices required for any operation shall be functional and in place prior to the commencement of the operations. Signs for temporary operations shall be removed during periods of inactivity. The Contractor is required to leave the project in a manner that will be safe to the traveling public and which will not impede motorists.

Traffic movements through lane closures on roads with two-way traffic shall be controlled by flaggers stationed at each end of the work zone. In situations where sight distance is limited, the Contractor shall provide additional means of controlling traffic, including, but not limited to, two-way radios, pilot vehicles, or additional flaggers. Flaggers shall be competent personnel, adequately trained in flagging procedures, and furnished with proper safety devices and equipment, including, but not limited to, safety vests and stop/slow paddles.

All personnel when working in traffic areas or areas in close proximity to traffic shall wear an approved safety vest, or shirt or jacket and hat or helmet which meets the color requirements of the Manual of Uniform Traffic Control Devices (MUTCD).

No work on this project shall start until all the traffic control devices required for the particular work activity have been installed, inspected and approved by the Project Engineer. The Contractor will be required to notify the City of Fayetteville Traffic Engineer five (5) working days prior to closing any street.

The furnishing, erecting, maintaining, relocating, and removing of traffic control devices will be in accordance with the current edition of the Manual on Uniform Traffic Devices for Streets and Highways.

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49. LIGHTS, BARRICADES, AND SIGNS

The Contractor shall provide, erect, and maintain all necessary barricades, suitable and sufficient red lights and danger signals. The Contractor shall also provide a sufficient number of watchmen and take all precautions for the protection of the work and safety of the public. It is the duty and responsibility of the Contractor to furnish and mount any necessary signs on suitable and approved standards. "Street Closed" signs shall be placed immediately adjacent to the work in a conspicuous position, at such locations where traffic demands. Whenever an intersection is closed to cross-bound traffic, "Street Closed at next intersection to through traffic" sign shall be placed one block on each side of the street closed in order to properly guide traffic around the closed street. If lighted barricades are not placed on open ditches or any other dangerous conditions that are hazardous to the public or as required by the Engineering Department, the City will place barricades at Contractor's expenses (Current City rates for labor, equipment and material will be charged).

50. PASSAGEWAYS TO BE LEFT CLEAR

The roadway on one side of the line of work and/or corridors (permanent or temporary) through the buildings shall be kept open at all times for the passage of vehicles or pedestrians to keep the Terminal and its associated site improvements in full operation at all times. The Contractor shall in all cases so arrange his work as to cause the least inconvenience to the public consistent with the proper prosecution of the work as determined by the Engineer. When deemed necessary by the Engineer the Contractor shall complete his work up to such point as designated by the Engineer before opening the work ahead, in order to give access to private property, etc. The opening of any street for travel shall not be held to be in any way an acceptance of the project or any part of it, or as a waiver of any of the provisions of these specifications and contract. Necessary repairs or renewals made on any section of the work, which has been opened to travel under instructions from the Engineer, due to defective materials or work pending completion and acceptance, shall be performed at the expenses of the Contractor.

51. PUBLIC SAFETY

Fire hydrants on or adjacent to the street shall be kept accessible to fire apparatus at all times.

52. PRESERVATION AND RESTORATION OF PROPERTY, ETC.,

The Contractor shall protect carefully from disturbance or damage all land monuments and property marks until the Engineer has witnessed or otherwise referenced their location and shall not remove them until directed. The Contractor shall protect all trees and shrubs designated to remain in the vicinity of the operations. When any direct or indirect damage or injury is done to public or

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private property, land monuments, or utility by or on account of any act, omission, neglect or misconduct in the execution of the work, or in consequence of the non-execution thereof on the part of the Contractor, he shall restore, at his own expenses, such property to a condition similar or equal to that existing before such damage or injury was done or he shall make good damage or injury in an acceptable manner.

53. PROTECTION OF WORK, PROPERTY AND THE PUBLIC

The Contractors shall be jointly responsible for the entire site and the building or construction of the same and provide all the necessary protections, as required by the City, and by laws or ordinances governing such conditions. They shall be responsible for any damage to the Owner's property or of that of others on the job by them, their personnel, or their subcontractors, and shall make good such damages. They shall be responsible for and pay for any claims against the City. All Contractors shall have access to the project at all times.

The Contractor shall provide cover and protect all portions of the structure when the work is not in progress, provide and set all temporary roofs, covers for doorways, sash and windows, and all other materials necessary to protect all the work on the building or any other facilities, whether set by him, or any of the subcontractors. Any work damaged through the lack of proper protection or from any other cause, shall be repaired or replaced without extra cost to the City.

No fires of any kind will be allowed inside or around the operations during the course of construction without special permission from the Engineer.

The Contractor shall barricade all walks, roads, etc., as directed by the Engineer or Contracting Officer to keep the public away from the construction. All trenches, excavations, or other hazards in the vicinity of the work shall be well barricaded and properly lighted at night.

54. WORKER SAFETY/OSHA

Contractor shall provide all necessary safety measures for the protection of all persons on the work site at all times during the prosecution of the work, regardless of whether the worker is an employee of the Contractor or a subcontractor. The Contractor is required to comply with the provisions of the "North Carolina Occupational Safety and Health Standards (OSHA) for the Construction Industry" and revisions thereto as adopted by General Statutes of North Carolina 95.126 through 155.

55. ROYALTIES, LICENSES AND PATENTS

It is the intention of the contract documents that the work covered herein will not constitute in any way infringement of any patent whatsoever unless the fact of

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such patent is clearly evidenced herein. The Contractor must notify the City immediately of any claim or infringement of any patent in connection with the performance of this contract.

The Contractor shall pay all royalties and/or license fees required on account of patented articles or processes, whether or not the patent rights are evidenced hereinafter.

The Contractor shall hold and save harmless the City, its officers, agents, servants, and employees from liability of any nature or kind for or on account of the use of any patented or unpatented invention, article, appliance, or process furnished or used in the performance of this contract, excepting patented articles required or designated by the City in its specifications, the use of which the Contractor does not control.

56. GUARANTEE

The Contractor(s) shall guarantee and warrant all labor and material for the project against defect due to faulty material, workmanship, and/or negligence for a period of ONE YEAR from the date of final inspection of the project. Where items of equipment or material carry a manufacturer's warranty for any period in excess of twelve (12) months, the manufacture's warranty shall apply for that particular piece of equipment or material. The Contractor shall respond to any repair request from the City within 48 hours of notice received by telephone, telegraph, or letter. The Contractor shall replace defective materials, equipment, or workmanship without cost to the City within the stipulated guarantee period.

57. CONTRACTOR'S RIGHT TO STOP WORK/TERMINATE CONTRACT

Should the work be stopped by order of a court having jurisdiction, or by order of any other public authority for a period of three (3) months, due to cause beyond the fault or control of the Contractor, or if the City should fail or refuse to make payment of account of a certificate issued by the Engineer within thirty (30) days after receipt of same, then the Contractor, after fifteen (15) days written notice sent by certified mail, return receipt requested, to the City and the Engineer, may suspend operations on the work or terminate the contract.

The City shall be liable to the Contractor for the cost of all specified materials delivered and work acceptably performed on this contract.

58. UTILITY CONFLICTS

It shall be the responsibility of the Contractor to contact all affected utility owners and determine the precise location of all utilities prior to beginning construction.

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Utility owners shall be contacted a minimum of 48 hours prior to the commencement of operations. Special care shall be used in working around or near existing utilities, protecting them when necessary to provide uninterrupted service. In the event that any utility service is interrupted, the Contractor shall notify the utility owner immediately and shall cooperate with the owner, or his representative, in the restoration of service in the shortest time possible. Existing hydrants shall be kept accessible to fire department at all times.

The Contractor shall adhere to all applicable regulations and follow accepted safety procedures when working in the vicinity of utilities in order to ensure the safety of construction personnel and the public.

Caution All Trades - Existing Copper Telephone Lines, Room B130B: All bidders and trades are hereby advised that the existing CenturyLink telephone utility service cable (300 pair copper) and a return feed cable (200 pair copper), run east-west under the floor slab of new telecommunications room B129 & B130B. These lines are believed to pass over the top of the existing “tree column” footing in B130B. These lines provide telephone and data service to terminal building tenants, including the airlines, TSA, rental car agencies and others, as well as service to the airfield lighting vault, ARFF/Fire Station 10 (including 911 dispatch), FAA ATCT complex (including flight safety data), the FBO and others. The Contractor shall protect these lines throughout the Part 2 project.

59. E-VERIFY REQUIREMENTS

Contractor hereby acknowledges that “E-Verify” is the federal E-Verify program operated by the US Department of Homeland Security and other federal agencies which is used to verify the work authorization of newly hired employees pursuant to federal law and in accordance with Article 2, Chapter 64 of the North Carolina General Statutes. Contractor further acknowledges that all employers, as defined by Article 2, Chapter 64 of the North Carolina General Statutes, must use E-Verify and after hiring an employee to work in the United States, shall verify the work authorization of the employee through E-Verify in accordance with NCGS §64-26(a). Contractor hereby pledges, attests and warrants through execution of this Agreement that Contractor complies with the requirements of Article 2 of Chapter 64 of the North Carolina General Statutes and further pledges, attests and warrants that any subcontractors currently employed by or subsequently hired by Contractor shall comply with any and all E-Verify requirements. Failure to comply with the above requirements shall be considered a breach of this Agreement.

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60. IRAN DIVESTMENT ACT CERTIFICATION

As mandated by N.C.G.S. 143C-6A-5(a), Bidder hereby certifies that it is not listed on the Final Divestment List created by the North Carolina State Treasurer pursuant to N.C.G.S. 143C-6A-4. Bidder further certifies that in accordance with N.C.G.S. 143C-6A-5(b) that it shall not utilize any subcontractor found on the State Treasurer's Final Divestment List. Bidder certifies that the signatory to this Request for Proposals is authorized by the Bidder to make the foregoing statement. **An Iran Divestment Certification form is attached in the Appendix for bidder to review, sign, and return with his bid.**

END OF SECTION

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PROJECT SPECIAL PROVISIONS

PSP-1 PROJECT CONSTRUCTION TRAFFIC SPEED LIMIT AND ADMINISTRATIVE FINES

Construction access for this project will use existing airport roadways. Construction traffic must share the road with normal airport traffic, including private passenger vehicles, rental cars, taxicabs, and commercial vehicles. The access routes include the airline passenger drop-off and pick up curb front area, multiple pedestrian crossings, taxi cab queueing areas, access to parking lots (passenger long term, passenger short term, rental car, general aviation, employee, management and FAA). The construction traffic speed limit for the terminal loop roadway, Air Freight Road, Control Tower Road, Corporate Road, Hangar Road and temporary routes marked on the GA and Air Carrier aprons shall be 15 MPH, regardless of any higher posted speed limits. All construction traffic, including but not limited to vehicles owned or operated by the general contractor, subcontractors, suppliers, freight carriers and all construction personnel shall strictly adhere to the 15 MPH construction traffic speed limit. In addition to applicable motor vehicle law enforcement, the Owner reserves the right to issue and the General Contractor shall be liable for an administrative fine of \$200.00 per speed limit infraction by any vehicle involved in the construction. The Contractor shall include traffic and pedestrian safety considerations in all project meetings with subcontractors and suppliers.

PSP-2 TRAFFIC CONTROL

The Contractor shall be responsible for traffic control in all roadway and parking lot areas affected by the work. All traffic control materials and procedures shall be in general accordance with NCDOT standards and the MUTCD. The Contractor shall furnish a package of traffic control signs as per the table shown on the plans and as may otherwise be required by the Contractor's operations. The list of signs shall be the minimum; it shall be the Contractor's responsibility to provide additional signs as may be needed in support of particular operations. The Contractor shall prepare and submit a traffic control plan sketch for all short term utility, storm drainage, grading, curb line, paving and other work operations which affect the roadside, roadway lanes and/or parking lot areas. The contractor shall provide temporary signage (as per the table and as otherwise needed), cones, drums, skinny drums, barricades, traffic plates, etc., in sufficient quantities as to safely guide vehicles and pedestrians around the work. The Contractor shall position and reposition signs, drums, cones, skinny drums, etc. as often as needed in support of the work. The Contractor shall provide flaggers as appropriate to the operation.

The terminal loop road, Air Freight Road, Control Tower Road, Corporate Road, Hangar Road and parking lots shall be open to traffic at all times. The July 2019 flight schedule shows the first departure at 5:25 am and the last arrival at 11:44 pm. Passenger and employee traffic extends beyond those hours, such that the overnight period with no traffic is quite short. The Contractor shall plan all operations crossing the loop road such that at least one traffic lane remains open to traffic at all times.

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All costs for project traffic control shall be included in the project lump sum bid.

PSP-3 ASBESTOS CONTAINING MATERIALS

A preconstruction inspection found that caulking and ceiling finish in certain areas of the 2nd floor old restaurant and 3rd floor manager's office is an asbestos containing material. A copy of that inspection and report is included in these construction documents. The Contractor shall retain a licensed asbestos abatement contractor to inspect these areas to determine the presence, nature, condition and extent of asbestos containing materials (ACM) to be removed and disposed; prepare the appropriate handling and disposal plans (including worker safety requirements and training/instruction and wet removal techniques); obtain the necessary permits; perform the abatement work; photo document the abatement work and provide landfill disposal documentation for each load. All such work shall be performed in accordance with federal, state and local laws, regulations and standards, including but not limited to 10A NCAC 41C Section .0600 and NCGS Chapter 130A, Article 19.

Abatement/disposal of the asbestos containing material shall be included in the project lump sum base bid price.

PSP-4 PROTECTION, RELOCATION AND RESTORATION OF UTILITIES AND SYSTEMS

It is the intent of this contract that the Contractor shall be responsible for including in the base bid and for coordinating and implementing all labor, materials and equipment, including the Contractor's forces and all subcontracted disciplines, for the identification, location, determination, protection, relocation and restoration of all utilities and systems serving the airline terminal complex. For the purposes of this provision, the term "utilities and systems" shall include the lines, equipment and service components owned and operated by public utilities (including but not limited to the Fayetteville Public Works Commission (PWC) (electric, water, sewer, Fiber Optic), CenturyLink, Time Warner Cable/Spectrum, Piedmont Natural Gas); the lines and equipment associated with City/airport and tenant owned and operated electrical, water, sewer, storm drainage, HVAC, data and communications (copper and fiber optic); and City/airport and tenant owned integrated systems (including but not limited to security monitoring, access control, FIDS, flight status, public address, lighting control, fire alarm, HVAC). The lines and equipment shall include those in underground, under slab, overhead, surface mounted, roof mounted and building interior locations, including concealed spaces. The Contractor and subcontractors shall consider the extent of existing utilities and systems in the facility and the extent and nature of the demolition and construction operations necessary for the work, and shall carry all such temporary and permanent materials and work necessary by all disciplines to protect, relocate and restore utility and system components such that those utilities and components remain in service

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throughout the construction period and remain intact and operational upon project completion, except to the extent that new and/or replacement utilities, systems and/or subsystems are specified, completed and placed into service. Temporary services which have been placed within the existing main terminal building shall be coordinated in advance with the Architect so as to avoid/minimize conflicts with this Part 2 construction. All costs for this work shall be included in the lump sum bid price for the project.

The Contractor shall include utility location services in the lump sum bid price for the project. For this purpose, the term “utility” shall be all inclusive, including but not limited to public and private utilities and service lines, water, sewer, gas, stormwater, electrical, communications, CATV, data, HVAC. The utility locating work shall include appropriate non-destructive techniques as well as test holes using vacuum extraction and/or other techniques. Test holes need not be executed in any given area until pavement removal operations are scheduled; however, critical crossings and alignments shall be confirmed by test hole sufficiently in advance (30 days) of proposed construction activities to allow for planning of grade and alignment adjustments. The Contractor shall obtain photographs, utility size measurements and positional measurements (horizontal and vertical) at all test holes and at all locations where utility elements are encountered in the course of the work. The utility locating work shall apply over the full limits of Part 1 construction. The Contractor shall submit utility location reports to the Architect for informational purposes within 14 days of the field work, and shall immediately report data applicable to critical crossings and whenever the data indicates a potential or apparent conflict with any element of the work.

PSP-5 EXISTING UTILITY INFORMATION SHOWN ON PLANS

Existing public and private utilities, service lines and systems as shown on the civil plans are based on Quality Level B geophysical utility locating/designating services conducted for project design, field survey, visual observation of physical features and information depicted on old drawings. The information, including approximate locations and depths shown on profiles and sections may not be entirely complete nor entirely accurate. It is the intent of this contract that the Contractor will locate and verify all existing utilities, service lines and systems near work elements and crossings, shall protect and relocate affected lines and shall notify the Architect without delay regarding any apparent discrepancies or conflicts as they are identified.

PSP-6 AIR CARRIER AND NORTH GA APRON MARKINGS

This contract may include marking removal and application of new relocated permanent pavement markings on the Air Carrier and North GA aprons. This work, which may be included by change order, shall be performed in accordance with specification section 020 620 and shall include removal of existing markings and painting new markings as needed to implement the proposed relocated aircraft parking layout for existing Concourse B.

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PSP-7 ROADWAY, PEDESTRIAN AND PARKING LOT MARKINGS

This contract includes marking removal and application of temporary and permanent pavement markings for roadways, pedestrian crossings, parking lots, curb lines and related uses. All such markings shall be in accordance with NCDOT details and specifications and as detailed on the plans. All costs shall be included in the lump sum bid price for the project.

PSP-8 AIR CARRIER APRON CONSTRUCTION STAGING

A portion of the Air Carrier Apron will be available to the Contractor for construction staging purposes for the demolition and reconstruction of the Main Terminal baggage outbound and inbound service areas. The Contractor shall be responsible for conducting staging operations and those of all subcontractors in a manner which prevents damage to the pavement and the joint sealant. Upon completion of construction operations, the contractor shall repair any staining, spalls, sealant damage, cracking, gouging or other damage to the satisfaction of the Architect and Owner. The Contractor is not granted general authorization to use core holes, drill holes or anchoring devices in the apron pavement for temporary fence lines or other temporary purpose. The Owner may consider but retains the right to refuse specific requests for temporary holes or anchorage. If so authorized, the Contractor shall patch all holes and remove and patch all anchorages using non-shrink grout to the full satisfaction of the Owner.

PSP-9 DUST AND FOD CONTROL

It is the intent of these specifications that the Contractor shall proactively control dust, grit, sand, gravel, debris, tools, hardware and loose material of any sort at all times during the course of the work. Active aircraft operations and airline ground support operations will be on-going on the apron adjacent to the work area. In addition to wind and rain, aircraft jet blast and propeller wash can lift and transport loose material, resulting in a significant FOD (foreign object damage) hazard, which can cause serious damage to aircraft, including engine damage and flight safety issues. The contractor shall maintain on site operational water truck, mechanical broom, vacuum sweeper and other equipment and shall utilize such equipment as frequently as necessary (including continuous operation) to prevent the occurrence of dust, grit or other hazard to aircraft safety or nuisance which is objectionable to the Airport, its tenants or the residents of the area or which violates existing laws or regulations.

The Contractor shall thoroughly clean and secure all work areas each day to the satisfaction of the Architect and Owner prior to releasing work crews.

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PSP-10 CONSTRUCTION SITE DRAINAGE

The Contractor will be required to establish and maintain temporary diversions, low point sumps and other means to allow for draining or pumping of runoff from the construction area. Dewatering pump discharge shall be directed into sediment trapping bags. Storm water runoff shall be removed from the construction site subgrade during and/or immediately following each rainfall event. All costs for maintaining construction site drainage shall be included in the project lump sum bid price.

PSP-11 DEBRIS DISPOSAL

The Contractor shall dispose of demolition debris off Airport property in a properly permitted facility. All costs for offsite disposal shall be included in the project lump sum bid. The Contractor is encouraged to recycle asphalt and concrete pavement materials.

PSP-12 MATERIAL MANIPULATION

The specifications require that soil materials be compacted within specific limits of optimum moisture. The wetting or drying of soil material, including any necessary manipulation to achieve the specified conditions, shall be included in the project lump sum price.

PSP-13 GROUND COVER REQUIREMENTS

In accordance with the North Carolina Sedimentation Control Rules (Title 15A, Chapter 4), a ground cover must be provided on all graded slopes within 14 working days following completion of any phase of grading and a permanent ground cover must be provided for all disturbed areas within 14 working days following completion of the final grading phase.

PSP-14 NIGHTTIME CONSTRUCTION OPERATIONS

Night time construction operations will be allowed on this project. The Contractor shall be responsible for providing adequate lighting for all work performed at night. Adequate lighting will be as determined by the Contractor and approved by the Architect and should be sufficient light to allow safe and continuous operation for all ongoing construction activities. Light provided should allow all equipment operators to see the work and to allow the Architect to provide adequate inspection. Construction lighting shall be positioned and oriented in a manner that does not result in light straying from the work area and impeding the visibility for air traffic controllers, airline ground personnel and pilots. Lighting and construction noise shall not create an undue nuisance in the residential area across Doc Bennett Road. Prior to any night time operations, the Contractor shall provide, at least 7 days in advance, a lighting layout plan to the Architect for review and coordination.

PSP-15 SALES TAX REPORTS

The Contractor shall submit a statement showing an invoice identification number, sales

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taxes paid to North Carolina, and sales taxes paid to county of vendor's location, for all material and equipment used in the project. A sales tax statement shall be submitted with each pay request and shall be accompanied by an affidavit verifying its accuracy. The sales tax reporting form will be provided to the Contractor.

PSP-16 CONSTRUCTION SAFETY AND PHASING PLAN

An Aviation Construction Safety and Phasing Plan (CSPP) document has been prepared for the project and is included as an Appendix to this project specification book. In accordance with FAA requirements, the Contractor shall review the document and prepare, submit and maintain (update) a Safety Plan Compliance Document (SPCD), providing supplemental data and formatted using the same Chapters as the CSPP.

PSP-17 EROSION AND SEDIMENTATION CONTROL PLAN AND CITY STORMWATER PERMIT

NCDEQ Erosion and Sedimentation Control Plan approval and City Stormwater approval are pending for this project. Copies of the E&S plan approval and associated state general stormwater permit coverage and the City Stormwater permit will be furnished to the Contractor. The Contractor shall comply with all conditions listed in the approval and permit documents, including self-inspection requirements. The Contractor shall cooperate with city and state inspectors regarding these approvals and permits. All costs are subsidiary to the project lump sum bid price.

PSP-18 FUEL AND ASPHALT CEMENT PRICE ADJUSTMENTS

Contract price adjustments WILL NOT be made based on fluctuations in fuel and/or asphalt cement prices.

PSP-19 LIST OF DOCUMENTS AVAILABLE TO BIDDERS.

Surveys, subsurface investigations, and environmental reports listed below have been used as data sources by the project design team. They are made available for review by bidders. It is understood and agreed that such information, whether included in the plans, specifications, or otherwise made available to the bidder, was obtained and compiled for the OWNER's design purposes only. Such information has been made available for the convenience of all bidders. It is further understood and agreed that each bidder is solely responsible for all assumptions, deductions, or conclusions which the bidder may make or obtain from his or her examination of the surveys, boring logs and other records of investigations and tests that are furnished by the OWNER. The survey information is intended solely to transmit horizontal and vertical control used for project design surveys; the Contractor shall conduct his own surveys and shall independently verify any and all control points to be used during project construction.

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Survey:

Survey Control, Fayetteville Regional Airport, Fayetteville, North Carolina, Accu Tech Surveying & Mapping, LLC, May 12, 2015.

Soils:

Report of Subsurface Investigation, GeoTechnologies, 11/09/2015
Addendum to Report of Subsurface Investigation, GeoTechnologies, 10/30/2015

Environmental:

Lead Paint Survey, Locklear, Locklear & Jacobs, 4/16/2015
Asbestos Survey, Locklear, Locklear & Jacobs, 4/14/2015
Final Report for Environmental Monitoring and Soil Screening, Withers & Ravenel, 5/23/2012
Soil Assessment Report, Withers & Ravenel, 11/2/2015

PSP-20 CAUTION ALL TRADES - EXISTING COPPER TELEPHONE LINES, ROOM B130B

All bidders and trades are hereby advised that the existing CenturyLink telephone utility service cable (300 pair copper) and a return feed cable (200 pair copper), run east-west under the floor slab of new telecommunications room B130B. These lines are believed to pass over the top of the existing "tree column" footing in that room. These lines provide telephone and data service to terminal building tenants, including the airlines, TSA, rental car agencies and others, as well as service to the airfield lighting vault, ARFF/Fire Station 10 (including 911 dispatch), FAA ATCT complex (including flight safety data), the FBO and others. The Contractor shall protect these lines throughout the Part 2 project.

PSP-21 CONTRACTOR CONTROL SURVEY

Horizontal and vertical control point data from the project design survey will be provided to the contractor. The contractor shall retain a North Carolina Licensed Land Surveyor to establish/verify horizontal and vertical control for the work. The contractor's surveyor shall perform field survey to verify the existing control points, shall reference available geodetic survey monuments in the project vicinity (including the NGS PAC and SAC monuments on the airfield) and shall report any inconsistencies noted. The contractor's surveyor shall set no fewer than 10 additional horizontal and vertical control points around the perimeter of the project area and beyond the project disturbance limits. Refer to the plans for additional contractor survey requirements related to the existing building. Within 45 days following Notice to Proceed, the contractor shall submit a sealed survey plan and a narrative report describing the control survey verification, additional control set and contractor building survey.

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PSP-22 SETTING UTILITY STRUCTURES TO FINAL GRADE

The Contractor shall set the tops of all utility structures (including but not limited to storm manholes, drainage inlets, sewer manholes, electrical hand holes, telecommunications handholes, cleanouts, valve boxes) to final finished grade, which may vary from top, rim or other surface grade indications shown on the plans. The Contractor shall review and verify grades prior to ordering structures and shall notify the architect of any discrepancies noted.

PSP-23 BUY AMERICAN ACT REQUIREMENTS – SUPPLEMENTAL INFORMATION

The FAA Buy American Act requirements are included in Appendix D, Federal Contract Requirements, sub-appendix A4. The base bid project and, separately, the add alternate(s) accepted by the Owner are each considered to be an “entire facility,” with the construction site in Fayetteville, North Carolina considered to be the location of final assembly.

Each bidder must submit with the bid two completed Certificate of Buy American Compliance – Total Facility (see Appendix B), representing the base bid and any alternate(s) accepted. The bidder must select one of two check boxes. With the first box (A), the bidder represents that only steel and manufactured products produced in the United States will be supplied and incorporated into the work, except for a limited number of exemptions. With the second box (B), the bidder represents inability to provide only steel and manufactured products produced in the United States (excepting exempt items), but will provide detailed documentation in support of a waiver request (a Type 3 waiver requires 60% US and exempt product; a Type 4 waiver requires demonstration that the total project cost for full compliance exceeds the total project cost without full compliance by 25% or more). Waivers cannot be granted by the Owner; the Owner will forward the Bidder’s waiver request documentation to the FAA office in Memphis for consideration and approval action.

Additional information regarding the FAA Buy American Act requirements can be found on the FAA Airports Division web site (https://www.faa.gov/airports/aip/buy_american/), including links to the Buy American statute, the FAA Buy American guidance in Appendix Y of the AIP Handbook, and the most recent FAA Nationwide Buy American Waivers Issued list.

To facilitate the orderly documentation to the Owner of Buy American compliance, the Contractor shall include with all material shop submittals a signed Buy American compliance statement, together with supporting documentation as to the manufacturing or production location for all steel and manufactured products, using the forms included here. Forms are provided for bid certificate check box A and for bid certificate check box B with a Type 3 waiver. In the event FAA issues a Type 4 waiver for the project, a similar form will be developed based on the details of the waiver.

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Material Shop Submittal - Buy American Compliance Statement									
Bid Document Page B-6 Check Box A - Steel and manufactured products produced in U.S. except standard FAA exemptions									
General Contractor:									
Subcontractor:									
Supplier:									
Submittal Number:									
Product:									
Manufacturer/Producer:									
Location of Manufacture/Production (City, State):									
<i>Attach documentation confirming location of manufacture/production. Products of unknown origin must be considered as non-domestic products in their entirety.</i>									
GENERAL CONTRACTOR'S STATEMENT TO OWNER									
This product, which is a component or sub-component of the facility:									
☐	Complies with the FAA Buy American Requirements.								
☐	Is Exempt from FAA Buy American Requirements								
	Basis:		subpart 25.108 list						
			FAA Nationwide Buy American Waivers List						
			AIP Handbook Table Y-3d (Asphalt, Cement, Concrete)						
☐	Is non-domestic; FAA waiver requested due to extenuating circumstances.								
By (name):									
Title:									
Signature									
Date									

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Material Shop Submittal - Buy American Compliance Statement							
Bid Document Page B-6 Check Box B - Project Type 3 Waiver							
General Contractor:							
Subcontractor:							
Supplier:							
Submittal Number:							
Product:							
Manufacturer/Producer:							
Location of Manufacture/Production (City, State):							
<i>Attach documentation confirming location of manufacture/production. Products of unknown origin must be considered as non-domestic products in their entirety.</i>							
GENERAL CONTRACTOR'S STATEMENT TO OWNER							
This product, which is a component or sub-component of the facility:							
	Complies with the FAA Buy American Requirements, and is included toward the 60% minimum U.S. content for the project Type 3 waiver request/approval.						
	Is Exempt from FAA Buy American Requirements						
	Basis:		subpart 25.108 list				
			FAA Nationwide Buy American Waivers List				
			AIP Handbook Table Y-3d (Asphalt, Cement, Concrete)				
	Is non-domestic, and was included in the listing of non-domestic products submitted with the original Type 3 waiver request/approval.						
	Is non-domestic and not included in the original listing; FAA waiver requested due to extenuating circumstances.						
Product Cost, Delivered to the Site:							
By (name):							
Title:							
Signature							
Date							

END OF PROJECT SPECIAL PROVISIONS

Project Special Provisions

PSP-10

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SECTION 01100 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Provisions and other Division 1 Specification Sections, apply to this Section.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

- A. Project Identification: Project consists of additions and renovations including but not limited to:
 - 1. Main Terminal 2-story Lobby Addition and renovations to all areas within
 - 2. Main Terminal boiler and chiller replacement with new mechanical room addition
 - 3. Replacement of all in-bound bag handling systems via award of alternates
 - 4. Renovations at Security Checkpoint Areas
 - 5. New Entrance Road Drop off area and Rental Car parking lot modifications
 - 6. New fire sprinkler system expansion and signage
- B. Project Location: 400 Airport, Fayetteville, NC 28306.
- C. Owner: City of Fayetteville, 433 Hay Street, Fayetteville, N.C. 28301
- D. Architect Identification: The Contract Documents, dated 07-15-2019, were prepared for the project by Gordon Johnson Architecture, 654 Hay Street Suite 4, Fayetteville, NC 28301 in association with Crawford Design Group, Fleming & Associates, and RMF Engineering, Inc.

1.3 CONTRACT

- A. Project will be constructed under a single prime contract to include all:
 - 1. General / structural construction
 - 2. Civil / site work construction
 - 3. Plumbing construction
 - 4. Mechanical construction
 - 5. Electrical construction
 - 6. Fire Protection construction
 - 7. Data / communications construction

1.4 USE OF PREMISES

- A. General: The Contractors shall have limited use of premises for construction operations, including use of Project site, during the construction period. Contractor's use of premises is limited to 1) their ability to be badged for security clearance, 2) by Owner's right to perform

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work, or 3) to retain other contractors on portions of the Project. The Owner will occupy and use all parts of the terminal facilities during ongoing renovations for normal Airport operations during the construction period.

1.5 SPECIFICATION FORMATS AND CONVENTIONS

- A. Specification Format: The Specifications are organized into Divisions and Sections using the 34-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. Consult the table of contents at the beginning of the Project Manual to determine numbers and names of sections in the Contract Documents.
- 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 are 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.

PART 2 - PRODUCTS (Not Used)

END OF SECTION 01100

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SECTION 01140 - WORK RESTRICTIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Provisions and other Division 1 Specification Sections, apply to this Section.

1.2 USE OF PREMISES

- A. Use of Site: Limit use of premises to work in areas indicated and as phased. Do not disturb portions of site beyond areas in which the Work is indicated.
 - 1. Limits: Confine construction operations to minimize impact on owner's operation of all facilities.
 - 2. Owner Occupancy: Allow for Owner occupancy of site and use by the public.
 - 3. Driveways and Entrances: Keep driveways and entrances whether permanent or temporary serving all premises not under construction clear and available to the public, the Owner, Owner's employees, and emergency vehicles at all times. Use only designated areas for parking or storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances.
- B. Use of Existing Building: Maintain existing building in a weathertight air conditioned condition throughout construction period. Repair damage caused by construction operations. Protect building, its contents, and its occupants during construction period.

1.3 OCCUPANCY REQUIREMENTS

- A. Full Owner Occupancy: Owner will occupy site and existing building during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01140

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SECTION 01230 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Provisions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This 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. 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: Modify 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 modifications 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 G-1: Provide all work associated with adding the elevator addition to Concourse B as shown on the plans and specifications.
- B. Add Alternate G-2: Provide all work associated with removing and replacing the two inbound baggage belt systems in Baggage Claim to include the four exterior rollup doors as defined on B0.001 – B7.005 drawings.
- C. Add Alternate G-3: Provide all work associated with replacing the TSA Checkpoint exit lane shown on the plans with an Automated Exit Lane Security Corridor specified in Division 11.
- D. Add Alternate G-4: Provide Owner's and Contractor's Protective Liability I.S.O.#CG 00 09 10 93 insurance policy as stated in the Supplemental General Provisions section 3.e.
- E. Add Alternate G-5: Provide Water Vapor Emission Control (Spec Section 033503) to new interior concrete slabs where new terrazzo finishes are proposed.

END OF SECTION 01230

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SECTION 01250 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Provisions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.

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, by written letter or memo signed and dated by the architect.

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 20 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.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
- 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 the Architect.

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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 an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

C. Proposal Request Form: Use AIA Document G709 or written letter for Proposal Requests.

1.5 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 or Owner provided form.

1.6 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714 or other form. 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 01250

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SECTION 01270 - UNIT PRICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Provisions and other Division 1 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 1 Section 01250 “Contract Modification Procedures” for procedures for submitting and handling change orders.
 - 2. Division 33 Section “Earthwork” For additional work beyond that shown on the drawings.

1.3 DEFINITIONS

- A. Unit price is an amount proposed by bidders, stated on the Bid Form, as a price per unit of measurement for materials or services added to or deducted from the Contract Sum by appropriate modification, if estimated quantities of Work required by the Contract Documents are increased or decreased.

1.4 PROCEDURES

- A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.
- B. Measurement and Payment: Refer to individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.
- C. 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 acceptable to Contractor.
- D. List of Unit Prices: A list of unit prices is included at the end of this Section. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 LIST OF UNIT PRICES

- A. Unit Price A-1 – Cost to undercut, excavate and refill with Compacted Suitable Soil, as Directed, per CY (if required) Dollars* (\$___) C.Y.
- B. Unit Price A-2 - Cost to undercut, excavate and refill with clean #57 or #67 Stone, as directed, per CY (if required) Dollars (\$___) C.Y.

*This above referenced item shall only be used if unsuitable soils are encountered one foot below the established sub-base. All work required to this limit shall be included in the Contractor's base bid.

END OF SECTION 01270

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SECTION 01310 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Provisions and other Division 1 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. General project coordination procedures.
 - 2. Conservation.
 - 3. Coordination Drawings.
 - 4. Administrative and supervisory personnel.
 - 5. Project meetings.
- B. Each contractor shall participate in coordination requirements. Certain areas of responsibility will be assigned to a specific contractor.
- C. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 1 Section "Closeout Procedures" for coordinating Contract closeout.

1.3 COORDINATION

- A. Coordination: Coordinate construction operations included in various 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.
- B. Coordination: Each contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its operations with operations, included in different Sections that depend on each other for proper installation, connection, and operation.
 - 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.

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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.
- C. If necessary, 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.
- D. 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.
- E. 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.

1.4 SUBMITTALS

- A. Coordination Drawings: Prepare Coordination Drawings if limited space availability necessitates maximum utilization of space for efficient installation of different components or if coordination is required for installation of products and materials fabricated by separate entities.
1. Indicate relationship of components shown on separate Shop Drawings.
 2. Indicate required installation sequences.
 3. Refer to Division 23 Section "Basic Mechanical Materials and Methods" and Division 26 Section "Basic Electrical Materials and Methods" for specific Coordination Drawing requirements for mechanical and electrical installations.
- B. Staff Names: Within 15 days of starting construction operations, submit a list of principal staff 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.

1.5 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.

1.6 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 3 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; manufacturers; 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. Phasing.
 - c. Critical work sequencing.
 - d. Designation of responsible personnel.
 - e. Procedures for processing field decisions and Change Orders.
 - f. Procedures for processing Applications for Payment.
 - g. Distribution of the Contract Documents.
 - h. Submittal procedures.
 - i. Preparation of Record Documents.
 - j. Use of the premises.
 - k. Responsibility for temporary facilities and controls.
 - l. Parking availability.
 - m. Office, work, and storage areas.
 - n. Equipment deliveries and priorities.

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- o. First aid.
 - p. Security.
 - q. Progress cleaning.
 - r. Working hours.
- C. Preinstallation Conferences: Conduct a pre-installation 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. Contract Documents.
 - b. Options.
 - c. Related Change Orders.
 - d. Purchases.
 - e. Deliveries.
 - f. Submittals.
 - g. Possible conflicts.
 - h. Compatibility problems.
 - i. Time schedules.
 - j. Weather limitations.
 - k. Manufacturer's written recommendations.
 - l. Warranty requirements.
 - m. Compatibility of materials.
 - n. Acceptability of substrates.
 - o. Temporary facilities and controls.
 - p. Space and access limitations.
 - q. Regulations of authorities having jurisdiction.
 - r. Testing and inspecting requirements.
 - s. Required performance results.
 - t. Protection of construction and personnel.
 - 3. Record significant conference discussions, agreements, and disagreements.
 - 4. 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 monthly 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.

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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.
 - 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) Change Orders.
 - 14) Documentation of information for payment requests.
3. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present. Include a brief summary, in narrative form, of progress since the previous meeting and report.
 - 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.
- E. Coordination Meetings: Conduct Project coordination meetings at bi-weekly intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
 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 the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

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- a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to Combined 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.
 - b. Schedule Updating: Revise Combined Contractor's Construction Schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
 - c. Review present and future needs of each contractor 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) Change Orders.
3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01310

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SECTION 01330 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Provisions and other Division 1 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 miscellaneous submittals.
- B. Related Sections include the following:
 - 1. Division 1 Section "Project Management and Coordination" for submitting Coordination Drawings.
 - 2. Division 1 Section "Closeout Procedures" for submitting warranties Project Record Documents and operation and maintenance manuals.

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 approval. Submittals may be rejected for not complying with requirements.

1.4 SUBMITTAL PROCEDURES

- A. General: Electronic copies of CAD Drawings of the Contract Drawings will not be provided by Architect for Contractor's use in preparing submittals.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. All submittals should be complete (ie: product data, warranties, mfg reports, shop drawings) packaged to include all relevant information needing a review and response for the proposed item. Partial submittals will not be accepted.
 - 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.

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- a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Submittals Schedule: Submit to the Architect a 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.
 1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 2. Concurrent Review: Where concurrent review of submittals by Architect's consultants, Owner, or other parties is required, allow 21 days for initial review of each submittal.
 3. Direct Transmittal to Consultant: Where the Contract Documents indicate that submittals may be transmitted directly to Architect's consultants, provide duplicate copy of transmittal to Architect. Submittal will be returned to Architect before being returned to Contractor.
 4. If intermediate submittal is necessary, process it in same manner as initial submittal.
 5. Allow 15 days for processing each resubmittal.
 6. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing.
- 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 4 by 5 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.
 - 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. Unique identifier, including revision number.
 - i. Number and title of appropriate Specification Section.
 - j. Drawing number and detail references, as appropriate.
 - k. Other necessary identification.
- F. Deviations: Highlight, encircle, or otherwise identify deviations from the Contract Documents on submittals.

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- G. Additional Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions of the Contract Documents, initial submittal may serve as final submittal.
1. Submit one copy of submittal via e-mail to concurrent reviewer in addition to Architect.
- H. Transmittal: Package each complete submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form via e-mail directly to Architect. Architect will return submittals, without review, received from sources other than Contractor. Architect will also not be required to download or upload submittals from Contractor's internal submittal management software.
1. 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 of the Contract Documents, including minor variations and limitations. Include the same label information as the related submittal.
 2. Include Contractor's certification stating that information submitted complies with requirements of the Contract Documents.
 3. 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. Submittal and transmittal distribution record.
 - i. Remarks.
 - j. Signature of transmitter.
- I. Distribution: Furnish electronic copy 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.
- J. Use for Construction: Use only final submittals with mark indicating action taken by Architect in connection with construction.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

- A. General: Prepare and submit Action Submittals required by individual Specification Sections.
1. Number of Copies: Submit one copy via e-mail of each General Construction submittal, or one copy of each plumbing, mechanical, electrical, and fire alarm submittal unless

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otherwise indicated. Architect will return one marked up electronic copy. Also provide marked up copy as a Project Record Document at Project Closeout.

- 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:
 - 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 operating and maintenance manuals.
 - k. Compliance with recognized trade association standards.
 - l. Compliance with recognized testing agency standards.
 - m. Application of testing agency labels and seals.
 - n. Notation of coordination requirements.
- 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.
1. Preparation: Include the following information, as applicable:
 - a. Dimensions.
 - b. Identification of products.
 - c. Fabrication and installation drawings.
 - d. Roughing-in and setting diagrams.
 - e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
 - f. Shopwork manufacturing instructions.
 - g. Templates and patterns.
 - h. Schedules.
 - i. Design calculations.
 - j. Compliance with specified standards.
 - k. Notation of coordination requirements.
 - l. Notation of dimensions established by field measurement.
 2. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.
 3. 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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4. Number of Copies: Submit one electronic copy via e-mail of each submittal. Retain one returned marked up copy as a Project as-built Drawing.
- D. Samples: Prepare physical units of materials or products, including the following:
 1. 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.
 2. Preparation: Mount, display, or package Samples in manner specified to facilitate review of qualities indicated. Prepare Samples to match Architect's sample where so indicated. Attach label on unexposed side that includes the following:
 - a. Generic description of Sample.
 - b. Product name or name of manufacturer.
 - c. Sample source.
 3. Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, provide the following:
 - a. Size limitations.
 - b. Compliance with recognized standards.
 - c. Availability.
 - d. Delivery time.
 4. Submit Samples for review of kind, color, pattern, and texture for a final check of these characteristics with other elements and for a comparison of these characteristics between final submittal and actual component as delivered and installed.
 - a. If variation in color, pattern, texture, or other characteristic is inherent in the product represented by a Sample, submit at least three sets of paired units that show approximate limits of the variations.
 - b. Refer to individual Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.
 5. Number of Samples for Initial Selection: Submit 2 full sets 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.
- E. Contractor's Construction Schedule: Comply with requirements in Division 1 Section "Project Management and Coordination" for Construction Manager's action.
- F. Submittals Schedule: Comply with requirements in Division 1 Section "Project Management and Coordination."
- G. Application for Payment: Comply with requirements in Division 1 Section "Project Management and Coordination."

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- H. Schedule of Values: Comply with requirements in Division 1 Section "Project Management and Coordination."
- 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 and title of related Specification Section(s) covered by subcontract.
 - 3. Drawing number and detail references, as appropriate, covered by subcontract.

2.2 INFORMATIONAL SUBMITTALS

- A. General: Prepare and submit Informational Submittals required by other Specification Sections.
 - 1. Number of Copies: Submit one electronic copy via e-mail 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 in Division 1 Section "Project Management and Coordination."
- B. Contractor's Construction Schedule: Comply with requirements in Division 1 Section "Project Management and Coordination."
- 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. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements.
- E. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.
- F. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements and, where required, is authorized for this specific Project.
- G. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements. Include evidence of manufacturing experience where required.

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- H. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements.
- 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.
- J. Preconstruction Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements.
- K. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- L. 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.
- M. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements. 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.
- N. 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.
- O. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements in Division 1 Section "Closeout Procedures."
- P. 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.

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- Q. 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.
- R. 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.
- S. 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.

2.3 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally-signed PDF electronic file and three paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

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3.1 CONTRACTOR'S REVIEW

- A. Review each submittal and check 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. Approved as submitted
 - 2. Approved as noted
 - 3. Revise and resubmit
 - 4. Rejected
- C. Informational Submittals: Architect will review each submittal and will not return it, or will reject and return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- D. Submittals not required by the Contract Documents will not be reviewed and may be discarded.

END OF SECTION 01330

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SECTION 01500 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Provisions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes requirements for temporary facilities and controls, including temporary utilities, support facilities, and security and protection facilities.
- B. Temporary utilities include, but are not limited to, the following:
 - 1. Sanitary facilities, including toilets, wash facilities, and drinking-water facilities.
 - 2. Heating and cooling facilities.
 - 3. Electric power service.
 - 4. Lighting.
 - 5. Telephone service.
- C. Support facilities include, but are not limited to, the following:
 - 1. Project identification and temporary signs.
 - 2. Waste disposal facilities.
 - 3. Field offices.
 - 4. Storage and fabrication sheds.
- D. Security and protection facilities include, but are not limited to, the following:
 - 1. Barricades, warning signs, and lights.
- E. Related Sections include the following:
 - 1. Division 2 Section "Termite Control" for pest control.
 - 2. Divisions 2 through 26 for temporary heat, ventilation, and humidity requirements for products in those Sections.

1.3 DEFINITIONS

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- 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.

1.4 USE CHARGES

- A. General: Cost or use charges for temporary facilities are not chargeable to Owner or Architect and shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, the following:
 - 1. Owner's construction forces.
 - 2. Occupants of Project.
 - 3. Architect.
 - 4. Testing agencies.
 - 5. Personnel of authorities having jurisdiction.
- B. Water Service: Use water from Owner's existing water system without metering and without payment of use charges.
- C. Electric Power Service: Use electric power from Owner's existing system without metering and without payment of use charges.

1.5 SUBMITTALS

- A. Implementation and Termination Schedule: Within 15 days of date established for submittal of Contractor's Construction Schedule, submit a schedule indicating implementation and termination of each temporary utility.

1.6 QUALITY ASSURANCE

- A. Standards: Comply with ANSI A10.6, NECA's "Temporary Electrical Facilities," and NFPA 241.
 - 1. Trade Jurisdictions: Assigned responsibilities for installation and operation of temporary utilities are not intended to interfere with trade regulations and union jurisdictions.
 - 2. 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.

1.7 PROJECT CONDITIONS

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

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1. 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.
- B. Conditions of Use: The following conditions apply to use of temporary services and facilities by all parties engaged in the Work:
 1. Keep temporary services and facilities clean and neat.
 2. Relocate temporary services and facilities as required by progress of the Work.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Provide new materials. Undamaged, previously used materials in serviceable condition may be used if approved by Architect. Provide materials suitable for use intended.
- B. Tarpaulins: Fire-resistive labeled with flame-spread rating of 15 or less.
- C. Water: Potable.

2.2 EQUIPMENT

- A. General: Provide equipment suitable for use intended.
- B. Field Offices: Mobile units with lockable entrances, operable windows, and serviceable finishes; heated and air conditioned; on foundations adequate for normal loading.
- C. Fire Extinguishers: Hand carried, portable, UL rated. Provide class and extinguishing agent as indicated or a combination of extinguishers of NFPA-recommended classes for exposures.
 1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.
- D. Self-Contained Toilet Units: Single-occupant units of chemical, aerated recirculation, or combustion type; vented; fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material.
- E. Drinking-Water Fixtures: Containerized, tap-dispenser, bottled-water drinking-water units, including paper cup supply.
- F. Heating Equipment: Unless Owner authorizes use of permanent heating system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

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1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
 2. Heating Units: Listed and labeled, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use for type of fuel being consumed.
- G. Electrical Outlets: Properly configured, NEMA-polarized outlets to prevent insertion of 110- to 120-V plugs into higher-voltage outlets; equipped with ground-fault circuit interrupters, reset button, and pilot light.
- H. Power Distribution System Circuits: Where permitted and overhead and exposed for surveillance, wiring circuits, not exceeding 125-V ac, 20-A rating, and lighting circuits may be nonmetallic sheathed cable.

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.
- B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Engage appropriate local utility company to install temporary service or connect to existing service. Where utility company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with utility company recommendations.
1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
 2. Provide adequate capacity at each stage of construction. Before temporary utility is available, provide trucked-in services.
 3. Obtain easements to bring temporary utilities to Project site where Owner's easements cannot be used for that purpose.
- B. Water Service: Use of Owner's existing water service facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
1. Provide rubber hoses as necessary to serve Project site.
 2. As soon as water is required at each level, extend service to form a temporary water- and fire-protection standpipe. Provide distribution piping. Space outlets so water can be reached with a 100-foot (30-m) hose. Provide one hose at each outlet.

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3. Where installations below an outlet might be damaged by spillage or leakage, provide a drip pan of suitable size to minimize water damage. Drain accumulated water promptly from pans.
- C. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking-water fixtures. Comply with regulations and health codes for type, number, location, operation, and maintenance of fixtures and facilities.
1. Disposable Supplies: Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Maintain adequate supply. Provide covered waste containers for disposal of used material.
 2. Toilets: Install self-contained toilet units. Shield toilets to ensure privacy. Provide separate facilities for male and female personnel.
 3. Wash Facilities: Install wash facilities supplied with potable water at convenient locations for personnel who handle materials that require wash up. Dispose of drainage properly. Supply cleaning compounds appropriate for each type of material handled.
 4. Drinking-Water Facilities: Provide bottled-water, drinking-water units.
 5. Locate toilets and drinking-water fixtures so personnel need not walk more than two stories vertically or 200 feet (60 m) horizontally to facilities.
- D. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment from that specified that will not have a harmful effect on completed installations or elements being installed.
- E. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment from that specified that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
- F. Electric Power Service: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include meters, transformers, overload-protected disconnecting means, automatic ground-fault interrupters, and main distribution switchgear.
1. Install electric power service underground, unless overhead service must be used.
 2. Install power distribution wiring overhead and rise vertically where least exposed to damage.
 3. Connect temporary service to Owner's existing power source, as directed by electric company officials.
- G. Electric Power Service: Use of Owner's existing electric power service will be permitted, as long as equipment is maintained in a condition acceptable to Owner.
- H. Electric Distribution: Provide receptacle outlets adequate for connection of power tools and equipment.

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1. Provide waterproof connectors to connect separate lengths of electrical power cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.
 2. Provide warning signs at power outlets other than 110 to 120 V.
 3. Provide metal conduit, tubing, or metallic cable for wiring exposed to possible damage. Provide rigid steel conduits for wiring exposed on grades, floors, decks, or other traffic areas.
 4. Provide metal conduit enclosures or boxes for wiring devices.
 5. Provide 4-gang outlets, spaced so 100-foot extension cord can reach each area for power hand tools and task lighting. Provide a separate 125-V ac, 20-A circuit for each outlet.
- I. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations and traffic conditions.
1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
 2. Provide one 100-W incandescent lamp per 500 sq. ft., uniformly distributed, for general lighting, or equivalent illumination.
 3. Provide one 100-W incandescent lamp every 50 feet in traffic areas.
- J. Telephone Service: Provide temporary telephone service throughout construction period for common-use facilities used by all personnel engaged in construction activities.
1. 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.
 2. Provide an answering machine on superintendent's telephone.
 3. Provide a portable cellular telephone for superintendent's use in making and receiving telephone calls when away from field office.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Locate field offices, storage sheds, sanitary facilities, and other temporary construction and support facilities for easy access.
2. Provide incombustible construction for offices, shops, and sheds located within construction area or within 30 feet of building lines. Comply with NFPA 241.

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3. 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. Traffic Controls: Provide temporary traffic controls at junction of temporary roads with public roads. Include warning signs for public traffic and "STOP" signs for entrance onto public roads. Comply with requirements of authorities having jurisdiction.
- C. Project Identification and Temporary Signs: Prepare Project identification and other signs in sizes indicated. Install signs where indicated to inform public and persons seeking entrance to Project. Do not permit installation of unauthorized signs.
 1. Engage an experienced sign fabricator to apply graphics for Project identification signs. Comply with details indicated for one 4' x 8' one sided sign.
 2. Prepare temporary signs to provide directional information to construction personnel and visitors.
 3. Construct signs of exterior-type Grade B-B high-density concrete form overlay plywood in sizes and thicknesses indicated. Support on posts or framing of preservative-treated wood or steel.
 4. Paint sign panel and applied graphics with exterior-grade alkyd gloss enamel over exterior primer or provide weather proof vinyl wrap.
- D. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Containerize and clearly label hazardous, dangerous, or unsanitary waste materials separately from other waste. Comply with Division 1 Section "Execution Requirements" for progress cleaning requirements.
 1. If required by authorities having jurisdiction, provide separate containers, clearly labeled, for each type of waste material to be deposited.
 2. Develop a waste management plan for Work performed on Project. Indicate types of waste materials Project will produce and estimate quantities of each type. Provide detailed information for on-site waste storage and separation of recyclable materials. Provide information on destination of each type of waste material and means to be used to dispose of all waste materials.
- E. Janitorial Services: Provide janitorial services on a daily basis for temporary offices, first-aid stations, toilets, wash facilities, lunchrooms, and similar areas.
- F. Common-Use Field Office: Provide an insulated, weathertight, air-conditioned field office for use as a common facility by all personnel engaged in construction activities; of sufficient size to accommodate required office personnel and meetings of 6 persons at Project site. Keep office clean and orderly.
- G. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment involved, including temporary utility services. Sheds may be open shelters or fully enclosed spaces within building or elsewhere on-site.

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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. Avoid using tools and equipment that produce harmful noise. Restrict use of noisemaking tools and equipment to hours that will minimize complaints from persons or firms near Project site.
- B. Stormwater Control: Provide earthen embankments and similar barriers in and around excavations and subgrade construction, sufficient to prevent flooding by runoff of stormwater from heavy rains.
- C. Pest Control: Before deep foundation work has been completed, retain a local exterminator or pest-control company to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests. Engage this pest-control service to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Obtain extended warranty for Owner. Perform control operations lawfully, using environmentally safe materials.
- D. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.
- E. Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erecting structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and public of possible hazard. Where appropriate and needed, provide lighting, including flashing red or amber lights.
 - 1. For safety barriers, sidewalk bridges, and similar uses, provide minimum 5/8-inch thick exterior plywood.
- F. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
 - 1. Where heating or cooling is needed and permanent enclosure is not complete, provide insulated temporary enclosures. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
 - 2. Vertical Openings: Close openings of 25 sq. ft. or less with plywood or similar materials.
 - 3. Horizontal Openings: Close openings in floor or roof decks and horizontal surfaces with load-bearing, wood-framed construction.
 - 4. Install tarpaulins securely using fire-retardant-treated wood framing and other materials.
 - 5. Where temporary wood or plywood enclosure exceeds 100 sq. ft. in area, use fire-retardant-treated material for framing and main sheathing.

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- G. Temporary Partitions: Erect and maintain dustproof partitions and temporary enclosures to limit dust and dirt migration and to separate areas from fumes and noise.
1. Construct dustproof partitions of not less than nominal 4-inch studs, 5/8-inch gypsum wallboard with joints taped on occupied side, and 1/2-inch fire-retardant plywood on construction side.
 2. Construct dustproof, floor-to-ceiling partitions of not less than nominal 4-inch studs, 2 layers of 3-mil polyethylene sheets, inside and outside temporary enclosure. Cover floor with 2 layers of 3-mil polyethylene sheets, extending sheets 18 inches up the side walls. Overlap and tape full length of joints. Cover floor with 3/4-inch fire-retardant plywood.
 3. Seal joints and perimeter. Equip partitions with dustproof doors and security locks.
 4. Protect air-handling equipment.
- H. Temporary Fire Protection: Until fire-protection needs are supplied by permanent facilities, install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.
1. Provide fire extinguishers, installed on walls on mounting brackets, visible and accessible from space being served, with sign mounted above.
 - a. Field Offices: Class A stored-pressure water-type extinguishers.
 - b. Other Locations: Class ABC dry-chemical extinguishers or a combination of extinguishers of NFPA-recommended classes for exposures.
 - c. Locate fire extinguishers where convenient and effective for their intended purpose; provide not less than one extinguisher on each floor at or near each usable stairwell.
 2. Store combustible materials in containers in fire-safe locations.
 3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire-protection facilities, stairways, and other access routes for firefighting. Prohibit smoking in hazardous fire-exposure areas.
 4. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition.
 5. Permanent Fire Protection: At earliest feasible date in each area of Project, complete installation of permanent fire-protection facility, including connected services, and place into operation and use. Instruct key personnel on use of facilities.
 6. Develop and supervise an overall fire-prevention and first-aid fire-protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
 7. Provide hoses for fire protection of sufficient length to reach construction areas. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.5 OPERATION, TERMINATION, AND REMOVAL

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- 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. Protect from damage caused by freezing temperatures and similar elements.
 - 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.
 - 2. Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.
- C. Temporary Facility Changeover: Except for using permanent fire protection as soon as available, do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. 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 the 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 in Division 1 Section "Closeout Procedures."

END OF SECTION 01500

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SECTION 01731 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Provisions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes procedural requirements for cutting and patching.
- B. Related Sections include the following:
 - 1. Division 1 Section "Selective Demolition" for demolition of selected portions of the building for alterations.
 - 2. Divisions 2 through 26 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
 - a. Requirements in this Section apply to mechanical and electrical installations. Refer to Divisions 22, 23 and 26 Sections for other requirements and limitations applicable to cutting and patching mechanical and electrical installations.

1.3 DEFINITIONS

- A. Cutting: Removal of existing 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 SUBMITTALS

- A. Cutting and Patching Proposal: Submit a proposal describing procedures at least 10 days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:
 - 1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
 - 2. Changes to Existing Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.

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3. Products: List products to be used and firms or entities that will perform the Work.
4. Dates: Indicate when cutting and patching will be performed.
5. Utilities: List utilities that cutting and patching procedures will disturb or affect. List utilities that will be relocated and those that will be temporarily out of service. Indicate how long service will be disrupted.
6. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.
7. Architect's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

1.5 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.
 1. **Cutting & patching of floor & roof decks require Architect's approval of a cutting and patching proposal.**
- B. Operational Elements: Do not cut and patch the following 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.
 1. Primary operational systems and equipment.
 2. Air or smoke barriers.
 3. Fire-protection systems.
 4. Control systems.
 5. Communication systems.
 6. Conveying systems.
 7. Electrical wiring systems.
 8. Operating systems of special construction in Division 13 Sections.
- C. Miscellaneous Elements: Do not cut and patch the following elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
 1. Water, moisture, or vapor barriers.
 2. Membranes and flashings.
 3. Exterior curtain-wall construction.
 4. Equipment supports.
 5. Piping, ductwork, vessels, and equipment.
 6. Noise- and vibration-control elements and systems.
 7. Existing roofing systems.
- 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

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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.

1. If possible, retain original Installer or fabricator to cut and patch exposed Work listed below. If it is impossible to engage original Installer or fabricator, engage another recognized, experienced, and specialized firm.
 - a. Processed concrete finishes.
 - b. Ornamental metal.
 - c. Matched-veneer woodwork.
 - d. Preformed metal panels.
 - e. Roofing.
 - f. Firestopping.
 - g. Window wall system.
 - h. Stucco and ornamental plaster.
 - i. Terrazzo.
 - j. Fluid-applied flooring.
 - k. Wall covering.
 - l. HVAC enclosures, cabinets, or covers.

- E. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.6 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections of these Specifications.
- B. Existing Materials: Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing 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 existing materials.

PART 3 - EXECUTION

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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 existing 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.
- B. Protection: Protect existing 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 Services: Where existing services are required to be removed, relocated, or abandoned, bypass such services before cutting to minimize interruption of services 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 existing 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 existing 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. Existing 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 2 Sections where required by cutting and patching operations.

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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 of these Specifications.
1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
 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.
 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 existing 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 existing 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.

END OF SECTION 01731

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SECTION 01732 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Provisions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Demolition and removal of selected portions of a building or structure.
 - 2. Demolition and removal of selected site elements.
 - 3. Repair procedures for selective demolition operations.
- B. Related Sections include the following:
 - 1. Division 1 Section "Summary" for use of the premises and phasing requirements.
 - 2. Division 1 Section "Work Restrictions" for restrictions on use of the premises due to owner or tenant occupancy.
 - 3. Division 1 Section "Temporary Facilities and Controls" for temporary construction and environmental-protection measures for selective demolition operations.
 - 4. Division 1 Section "Cutting and Patching" for cutting and patching procedures for selective demolition operations.
 - 5. Division 22 & 23 Sections for demolishing, cutting, patching, or relocating plumbing and mechanical items.
 - 6. Division 26 Section for demolishing, cutting, patching, or relocating electrical items.

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: Detach items from existing construction and deliver them to owner.
- C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.
- D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

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1.4 MATERIALS OWNERSHIP

- A. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, demolished materials shall become Contractor's property and shall be removed from Project site.
- B. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may be encountered during selective demolition remain Owner's property. Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to Owner.

1.5 PROJECT CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted. Provide not less than 48 hours' notice to Owner of activities that will affect Owner's operations.
- B. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities.
 - 1. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from authorities having jurisdiction.
- C. Owner assumes no responsibility for condition of areas to be selectively demolished.
 - 1. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
 - 2. Before selective demolition, Owner will remove the following items:
 - a. All loose furniture and vending machines.
- D. Hazardous Materials: Hazardous materials will be encountered in the Work. Hazardous materials will be removed by Contractor before start of demolition work in the affected areas as noted in the Asbestos Survey performed by LL&J, PLLC.
- E. Storage or sale of removed items or materials on-site will not be permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Maintain fire-protection facilities in service during selective demolition operations.

1.6 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

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1. If possible, retain original Installer or fabricator to patch the exposed Work listed below that is damaged during selective demolition. If it is impossible to engage original Installer or fabricator, engage another recognized experienced and specialized firm.
 - a. Roofing.
 - b. Stucco and ornamental plaster.
 - c. Terrazzo.

PART 2 - PRODUCTS

2.1 REPAIR MATERIALS

- A. Use repair materials identical to existing materials.
 1. If 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 materials whose installed performance equals or surpasses that of existing materials.
- B. Comply with material and installation requirements specified in individual Specification Sections.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.
- D. 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.
- E. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.2 UTILITY SERVICES

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- A. Existing Utilities: Maintain services indicated to remain and protect them against damage during selective demolition operations.
- B. Do not interrupt existing utilities serving occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and to authorities having jurisdiction.
 - 1. Provide at least 48 hours' notice to Owner if shutdown of service is required during changeover.
- C. Utility Requirements: Locate, identify, disconnect, and seal or cap off indicated utilities serving areas to be selectively demolished.
 - 1. The Building Manager will arrange to shut off indicated utilities when requested by Contractor.
 - 2. Arrange to shut off indicated utilities with utility companies.
 - 3. If utility services are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary utilities that bypass area of selective demolition and that maintain continuity of service to other parts of building.
 - 4. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.
- D. Utility Requirements: Refer to Division 22, 23 and 26 Sections for shutting off, disconnecting, removing, and sealing or capping utilities. Do not start selective demolition work until utility disconnecting and sealing have been completed and verified in writing.

3.3 PREPARATION

- A. Dangerous Materials: Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with selective demolition operations.
- B. Pest Control: Employ a certified, licensed exterminator to treat building and to control rodents and vermin before and during selective demolition operations.
- C. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Do not close or obstruct streets, walks, walkways, 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.
 - 2. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.
 - 3. Protect existing site improvements, appurtenances, and landscaping to remain.

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- D. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 - 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 - 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 - 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 - 4. Cover and protect furniture, furnishings, and equipment that have not been removed.
- E. Temporary Enclosures: Provide temporary enclosures for protection of existing building and construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
 - 1. Where heating or cooling is needed and permanent enclosure is not complete, provide insulated temporary enclosures. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
- F. Temporary Partitions: Erect and maintain dustproof partitions and temporary enclosures to limit dust and dirt migration and to separate areas from fumes and noise.

3.4 POLLUTION CONTROLS

- A. Dust Control: Use water mist, temporary enclosures, and other suitable methods to limit 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.
 - 2. Wet mop floors to eliminate trackable dirt and wipe down walls and doors of demolition enclosure. Vacuum carpeted areas.
- B. Disposal: Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- C. Cleaning: 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.

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:

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1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
 5. Maintain adequate ventilation when using cutting torches.
 6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 7. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 8. Dispose of demolished items and materials promptly.
 9. Return elements of construction and surfaces that are to remain to condition existing before selective demolition operations began.
- B. Existing Facilities: Comply with building manager's requirements for using and protecting elevators, stairs, walkways, loading docks, building entries, and other building facilities during selective demolition operations.
- C. Removed and Salvaged Items: Comply with the following:
1. Clean salvaged items.
 2. Pack or crate items after cleaning. Identify contents of containers.
 3. Store items in a secure area until delivery to Owner.
 4. Protect items from damage during storage.
 5. Transport items to owner's storage area on-site.
- D. Removed and Reinstalled Items: Comply with the following:
1. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
 3. Protect items from damage during transport and storage.
 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable,

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protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

- F. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals, using power-driven saw, then remove concrete between saw cuts.
- G. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.
- H. Roofing: Remove no more existing roofing than can be covered in one day by new roofing. Refer to applicable Division 7 Section for new roofing requirements.
- I. Air-Conditioning Equipment: Remove equipment without releasing refrigerants.

3.6 PATCHING AND REPAIRS

- A. General: Promptly repair damage to adjacent construction caused by selective demolition operations.
- B. Repairs: Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials.
 - 1. Completely fill holes and depressions in existing masonry walls that are to remain with an approved masonry patching material applied according to manufacturer's written recommendations.
- C. Finishes: Restore exposed finishes of patched areas and extend restoration into adjoining construction in a manner that eliminates evidence of patching and refinishing.
- D. Floors and Walls: Where walls or partitions that are demolished 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 existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - 1. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications.
 - 2. Where patching occurs in a painted surface, apply primer and intermediate paint coats over patch and apply final paint coat over entire unbroken surface containing patch. Provide additional coats until patch blends with adjacent surfaces.
 - 3. Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
- E. Ceilings: Patch, repair, or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.
- F. Patching: Comply with Division 1 Section "Cutting and Patching."

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3.7 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.
- B. Burning: Do not burn demolished materials.
- C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

END OF SECTION 01732

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SECTION 01770 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Provisions and other Division 1 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. Project Record Documents.
 - 3. Operation and maintenance manuals.
 - 4. Warranties.
 - 5. Instruction of Owner's personnel.
 - 6. Final cleaning.
- B. Related Sections include the following:
 - 1. Divisions 2 through 16 Sections for specific closeout and special cleaning requirements for products of 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.
 - 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, damage or settlement surveys, property surveys, 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.

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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. Re-inspection: Request re-inspection 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 General Provisions "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. Submit pest-control final inspection report and warranty.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

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. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is complete or corrected.

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1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Preparation: Submit one copy 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 and proceeding from lowest room # to highest room #.
 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 PROJECT RECORD DOCUMENTS

- A. General: Do not use Project Record Documents for construction purposes. Protect Project Record Documents from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.
- B. Record Drawings: Maintain and submit one set of blue- or black-line white prints of Contract Drawings and Shop Drawings.
1. 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 cannot be readily identified and recorded 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.
 - d. Mark Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. Where Shop Drawings are marked, show cross-reference on Contract Drawings.
 2. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at the same location.
 3. Mark important additional information that was either shown schematically or omitted from original Drawings.
 4. Note Construction Change Directive numbers, Change Order numbers, alternate numbers, and similar identification where applicable.

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5. Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location. Organize into manageable sets; bind each set with durable paper cover sheets. Include identification on cover sheets.
- C. Record Specifications: Submit one copy of Project's Specifications, including addenda and contract modifications. Mark copy to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 3. Note related Change Orders, Record Drawings, and Product Data, where applicable.
- D. Record Product Data: Submit one copy of each Product Data submittal. Mark one set to indicate the actual product installation where installation varies substantially from that indicated in Product Data.
 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 3. Note related Change Orders, Record Drawings, and Record Specifications, where applicable.
- E. Miscellaneous Record Submittals: 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.

1.7 OPERATION AND MAINTENANCE MANUALS

- A. Assemble a complete set of operation and maintenance data indicating the operation and maintenance of each system, subsystem, and piece of equipment not part of a system. Include operation and maintenance data required in individual Specification Sections and as follows:
 1. Operation Data:
 - a. Emergency instructions and procedures.
 - b. System, subsystem, and equipment descriptions, including operating standards.
 - c. Operating procedures, including startup, shutdown, seasonal, and weekend operations.
 - d. Description of controls and sequence of operations.
 - e. Piping diagrams.
 2. Maintenance Data:
 - a. Manufacturer's information, including list of spare parts.

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- b. Name, address, and telephone number of Installer or supplier.
 - c. Maintenance procedures.
 - d. Maintenance and service schedules for preventive and routine maintenance.
 - e. Maintenance record forms.
 - f. Sources of spare parts and maintenance materials.
 - g. Copies of maintenance service agreements.
 - h. Copies of warranties and bonds.
- B. Organize operation and maintenance manuals into suitable sets of manageable size. Bind and index data in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, with pocket inside the covers to receive folded oversized sheets. Identify each binder on front and spine with the printed title "OPERATION AND MAINTENANCE MANUAL," Project name, and subject matter of contents. Also provide same material organized in electronic pdf format on CDs.

1.8 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 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.
 - 4. Provide same material described in item #3 above in electronic pdf format on CDs.
- D. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

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- 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 DEMONSTRATION AND TRAINING

- A. **Instruction:** Instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
 - 1. Provide instructors experienced in operation and maintenance procedures.
 - 2. Provide instruction at mutually agreed-on times. For equipment that requires seasonal operation, provide similar instruction at the start of each season.
 - 3. Schedule training with Owner, through Architect, with at least seven days' advance notice.
 - 4. Coordinate instructors, including providing notification of dates, times, length of instruction, and course content.
- B. **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. For each training module, develop a learning objective and teaching outline. Include instruction for the following:
 - 1. System design and operational philosophy.
 - 2. Review of documentation.
 - 3. Operations.
 - 4. Adjustments.
 - 5. Troubleshooting.
 - 6. Maintenance.
 - 7. Repair.

3.2 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 anti-pollution 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:

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- 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.
- 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. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
- j. 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.
- k. Remove labels that are not permanent.
- l. 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.
- m. Wipe surfaces of mechanical and electrical equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
- n. Replace parts subject to unusual operating conditions.
- o. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
- p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
- q. Clean ducts, blowers, and coils if units were operated without filters during construction.
- r. 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.
- s. Leave Project clean and ready for occupancy.

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- C. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid Project of rodents, insects, and other pests. Prepare a report.
- D. 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 01770

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SECTION 02361 - TERMITE CONTROL

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 for termite control:
 - 1. Soil treatment.

1.3 DEFINITIONS

- A. EPA: Environmental Protection Agency.
- B. PCO: Pest control operator.

1.4 SUBMITTALS

- A. Product Data: Treatments and application instructions, including EPA-Registered Label.
- B. Product Certificates: Signed by manufacturers of termite control products certifying that treatments furnished comply with requirements.
- C. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- D. Soil Treatment Application Report: After application of termiticide is completed, submit report for Owner's record information, including the following as applicable:
 - 1. Date and time of application.
 - 2. Moisture content of soil before application.
 - 3. Brand name and manufacturer of termiticide.
 - 4. Quantity of undiluted termiticide used.
 - 5. Dilutions, methods, volumes, and rates of application used.
 - 6. Areas of application.
 - 7. Water source for application.

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- E. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

- A. Applicator Qualifications: A PCO who is licensed according to regulations of authorities having jurisdiction to apply termite control treatment in jurisdiction where Project is located and who is experienced and has completed termite control treatment similar to that indicated for this Project and whose work has a record of successful in-service performance.
- B. Regulatory Requirements: Formulate and apply termiticides, and label with a Federal registration number, to comply with EPA regulations and authorities having jurisdiction.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: To ensure penetration, do not treat soil that is water saturated or frozen. Do not treat soil while precipitation is occurring. Comply with EPA-Registered Label requirements and requirements of authorities having jurisdiction.

1.7 COORDINATION

- A. Coordinate soil treatment application with excavating, filling, and grading and concreting operations. Treat soil under footings, grade beams, and ground-supported slabs, before construction.

1.8 WARRANTY

- A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Special Warranty: Written warranty, signed by applicator and Contractor certifying that termite control work, consisting of applied soil termiticide treatment, will prevent infestation of subterranean termites. If subterranean termite activity or damage is discovered during warranty period, re-treat soil and repair or replace damage caused by termite infestation.
- C. Warranty Period: Three years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOIL TREATMENT

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- A. Termiticide: Provide an EPA-registered termiticide complying with requirements of authorities having jurisdiction, in a soluble or emulsible, concentrated formulation that dilutes with water or foaming agent, and formulated to prevent termite infestation. Use only soil treatment solutions that are not harmful to plants. Provide quantity required for application at the label volume and rate for the maximum termiticide concentration allowed for each specific use, according to the product's EPA-Registered Label.
- B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- C. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. AgrEvo Environmental Health, Inc.; a Company of Hoechst and Schering, Berlin.
 - 2. American Cyanamid Co.; Agricultural Products Group; Specialty Products Department.
 - 3. Bayer Corp.; Garden & Professional Care.
 - 4. DowElanco.
 - 5. FMC Corp.; Pest Control Specialties.
 - 6. Zeneca Professional Products.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for moisture content of the soil, interfaces with earthwork, slab and foundation work, landscaping, and other conditions affecting performance of termite control. Proceed with application only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's written instructions for preparing substrate. Remove all extraneous sources of wood cellulose and other edible materials such as wood debris, tree stumps and roots, stakes, formwork, and construction waste wood from soil and around foundations.
- B. Soil Treatment Preparation: Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated. Loosen, rake, and level soil to be treated, except previously compacted areas under slabs and footings. Termiticides may be applied before placing compacted fill under slabs if recommended by termiticide manufacturer.
- C. Fit filling hose connected to water source at the site with a backflow preventer, complying with requirements of authorities having jurisdiction.

3.3 APPLICATION, GENERAL

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- A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's EPA-Registered Label for products.

3.4 APPLYING SOIL TREATMENT

- A. Application: Mix soil treatment termiticide solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of termiticide, according to manufacturer's EPA-Registered Label, to the following so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction. Distribute the treatment evenly.
 - 1. Slabs-on-Grade and Basement Slabs: Under ground-supported slab construction, including footings, building slabs, and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed.
 - 2. Foundations: Adjacent soil including soil along entire inside perimeter of foundation walls, along both sides of interior partition walls, around plumbing pipes and electric conduit penetrating slab, and around interior column footers, piers, and chimney bases; and along entire outside perimeter, from grade to bottom of footing. Avoid soil washout around footings.
 - 3. Crawlspace: Soil under and adjacent to foundations as previously indicated. Treat adjacent areas including around entrance platform, porches, and equipment bases. Apply overall treatment only where attached concrete platform and porches are on fill or ground.
 - 4. Masonry: Treat voids.
 - 5. Penetrations: At expansion joints, control joints, and areas where slabs will be penetrated.
- B. Avoid disturbance of treated soil after application. Keep off treated areas until completely dry.
- C. Protect termiticide solution, dispersed in treated soils and fills, from being diluted until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.
- D. Post warning signs in areas of application.
- E. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

END OF SECTION 02361

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SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.
- B. Related Requirements:
 - 1. Section 312000 "Earth Moving" for drainage fill under slabs-on-grade.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Design Mixtures: For each concrete mixture.
- C. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement.

1.3 INFORMATIONAL SUBMITTALS

- A. Material certificates.
- B. Material test reports.
- C. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer, detailing fabrication, assembly, and support of formwork.
- D. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.

1.4 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 "Certification of Ready Mixed Concrete Production Facilities."

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- B. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1.5 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 306.1.
 - 1. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- B. Hot-Weather Placement: Comply with ACI 305R.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301
 - 2. ACI 117

2.2 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

2.3 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- B. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.
- C. Plain-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, plain, fabricated from as-drawn steel wire into flat sheets.
- D. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice."

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2.4 CONCRETE MATERIALS

A. Cementitious Materials:

1. Portland Cement: ASTM C 150, Type I/II.
2. Fly Ash: ASTM C 618, Class F

B. Normal-Weight Aggregates: ASTM C 33, uniformly graded.

1. Maximum Coarse-Aggregate Size: $\frac{3}{4}$ inches (U.N.O.). 1 inch at footings.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Lightweight Aggregate: ASTM C 330, 3/4-inch nominal maximum aggregate size.

D. Air-Entraining Admixture: ASTM C 260/C 260M.

E. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494, Type A.
2. Retarding Admixture: ASTM C 494, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.

F. Water: ASTM C 94 and potable.

2.5 WATERSTOPS

A. Flexible Rubber Waterstops: CE CRD-C 513, with factory-installed metal eyelets, for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.

2.6 VAPOR RETARDERS

A. Sheet Vapor Retarder: Polyethylene sheet, ASTM D 4397, not less than 10 mils thick.

2.7 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete. Retain curing aids and materials from remaining paragraphs.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

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- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

2.8 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

2.9 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 - 1. Fly Ash: 25 percent
- C. Admixtures: Use admixtures according to manufacturer's written instructions.
 - 1. Use water-reducing admixture in concrete, as required, for placement and workability.
 - 2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 - 3. Use water-reducing admixture in pumped concrete, parking structure slabs, concrete required to be watertight, and concrete with a w/c ratio below 0.50.

2.10 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Normal-Weight Concrete:
 - 1. Minimum Compressive Strength: As indicated at 28 days.
 - 2. Maximum W/C Ratio: 0.45.
 - 3. Slump Limit: 5 inches at point of delivery for concrete with verified slump of 2 to 4 inches before adding water-reducing admixture.
 - 4. Air Content: 3.5 percent, plus or minus 1.5 percent, unless otherwise indicated. Do not allow air content of trowel-finished floors to exceed 3 percent.
 - 5. Air Content: 5 percent, plus or minus 1.5 percent at point of delivery for building concrete walls and piers. Increase air content to 6 percent plus or minus 1.5 percent at concrete site retaining walls.
- B. Suspended Slabs: Lightweight concrete.
 - 1. Minimum Compressive Strength: 4000 psi at 28 days.
 - 2. Calculated Equilibrium Unit Weight: 120 lb/cu. ft., plus or minus 5 lb/cu. ft. as determined by ASTM C 567.
 - 3. Slump Limit: 4 inches, plus or minus 1 inch at point of delivery.
 - 4. Air Content: 3.5 percent, plus or minus 1.5 percent, unless otherwise indicated. Do not allow air content of trowel-finished floors to exceed 3 percent.

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2.11 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.12 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94 and ASTM C 1116, and furnish batch ticket information.
 - 1. 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 INSTALLATION

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117 .
- C. Chamfer exterior corners and edges of permanently exposed concrete.

3.2 EMBEDDED ITEM INSTALLATION

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.3 VAPOR-RETARDER INSTALLATION

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.
 - 1. Lap joints 6 inches and seal with manufacturer's recommended tape.

3.4 STEEL REINFORCEMENT INSTALLATION

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

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1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

3.5 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness or 1.25 inch minimum as follows:
 1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 3/16 inch wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks (4 to 12 hours after concrete placement).
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated unless noted otherwise.

3.6 WATERSTOP INSTALLATION

- A. Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions.

3.7 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.
- B. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
 1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.

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3.8 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 - 1. Apply to concrete surfaces not exposed to public view.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 - 1. Apply to concrete surfaces exposed to public view.
- C. Rubbed Finish: Apply the following to smooth-formed-finished as-cast concrete where indicated:
 - 1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
 - 2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix 1 part portland cement to 1-1/2 parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
 - 3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix 1 part portland cement and 1 part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.
- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.9 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch in one direction.
 - 1. Apply scratch finish to surfaces indicated.

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- C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.
 - 1. Apply float finish to surfaces indicated to receive trowel finish.
- D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
 - 1. Apply a trowel finish to surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
 - 2. Finish and measure surface, so gap at any point between concrete surface and an unlevelled, freestanding, 10-ft.- long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/8 inch.
- E. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.
 - 1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.10 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 305R for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.
- D. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days.
 - 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 not less than seven

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- days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound does not interfere with bonding of floor covering used on Project.
 4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a 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. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.11 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
- C. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
 1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 2. After concrete has cured at least 14 days, correct high areas by grinding.
 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
 4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
 5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.

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6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least 3/4 inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mix as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
 7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- D. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- E. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.12 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a special inspector and a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to sample materials, perform tests, and submit test reports according to requirements specified in this Article and the Schedule of Structural Special Inspection Services. Testing agency will continuously monitor placement of structural concrete according to the Schedule of Structural Special Inspection Services.
- C. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
1. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mix placed each day.
 - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mix, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 2. Slump: ASTM C 143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mix. Perform additional tests when concrete consistency appears to change.
 3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; ASTM C 173, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.

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4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
5. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.
6. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of four standard cylinder specimens for each composite sample.
7. Compressive-Strength Tests: ASTM C 39; test two laboratory-cured specimens at 7 days and two at 28 days.
 - a. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at age indicated.
- D. Strength of each concrete mix will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
- E. 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 mix proportions and materials, compressive breaking strength, and type of break for both 7-and 28-day tests.
- F. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
- G. Additional Tests: Testing 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 C 42 or by other methods as directed by Architect.
- H. Special Inspections: Special Inspector is to obtain Testing Agency testing reports. Verify completion of testing and compliance with the Contract Documents. Special Inspector is to verify and/or inspect construction in accordance with the Schedule of Structural Special Inspection Services.
- I. General Contractor is to correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

END OF SECTION 033000

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SECTION 033503 – WATER VAPOR EMISSION CONTROL

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 concrete sealers for the remediation of excessive moisture in concrete slabs.

1.3 SYSTEM DESCRIPTION

- A. Provide liquid penetrant concrete sealer and cementitious underlayment to mechanically and chemically reduce water vapor emission and alkalinity from concrete slab to levels acceptable to manufacturer of finish floor covering and adhesive. Work includes preconstruction testing, preparation of slab, application of sealant, and field quality control.

1.4 PERFORMANCE REQUIREMENTS

- A. Provide concrete sealer to remediate excessive moisture in floor slab so that moisture-vapor-emission will not exceed 3 lb of water/1000 sq. ft. in 24 hours.
- B. Material Compatibility: Provide vapor emission control system materials that are compatible with one another and finish flooring adhesives under conditions of service and application required, as demonstrated by system manufacturer based on testing and long-term field experience.

1.5 SUBMITTALS

- A. Product Data: For each type of product indicated. Include material descriptions, chemical composition, physical properties, test data, and mixing, preparation, and application instructions.
- B. Qualification Data for Installer and Testing Agency.
- C. Field Quality Control Test Reports.
- D. Special Warranties.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Installer that employs workers trained and approved by manufacturer to apply sealers.
- B. Testing Agency Qualifications: An independent testing agency, acceptable to manufacturer, with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.
- C. Manufacturer Qualifications:
 - 1. Minimum 5 years of producing moisture vapor control emission products.
 - 2. Minimum 5 years of product application experience.

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3. Employs factory-trained representatives who are available for consultation and Project-site inspection.
4. Warranty program covering costs associated with repair or replacement of concrete vapor emission control system and finish floor covering or coating, including repair or replacement labor.
5. Warranty program covering costs for both system materials and system installation for prescribed vapor emission control system treatment.
- D. Source Limitations: Obtain concrete sealers through one source from a single manufacturer. Product shall be acceptable to manufacturer of finish flooring and adhesive.
- E. Inform manufacturer's technical representative of all concrete additives used in the concrete mix or preparation of the slab.
- F. Test area: Shot blast a test area, as designated by Architect, to evaluate the surface condition and verify that treated area will be acceptable to installer of finish flooring.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in manufacturer's original and unopened containers, labeled with type and name of products and manufacturers.
- B. Comply with manufacturer's written instructions for minimum and maximum temperature requirements and other conditions for storage.

1.8 PROJECT CONDITIONS

- A. Environmental Limitations for Sealers: Comply with manufacturer's recommendations for ambient temperature, humidity and condition of slab.
- B. Allow for continuous ventilation and indirect air movement at all times during application and curing process of the water vapor reduction system.

1.9 WARRANTY

- A. The manufacturer warrants that when applied according to manufacturer's written recommendations on properly prepared concrete slab as accepted by manufacturer's technical representative the water vapor reduction system will reduce water vapor emissions by 80 percent as indicated by testing by independent testing agency.
 1. Warranty shall not exclude non-conformance to ACI 318, foreign salts, admixtures, resin and silicate surface treatments or cohesive failure in the concrete surface due to normal concrete movement.
- B. Special Warranty: Manufacturer's standard form in which manufacturer warrants water vapor reduction system against defects in material and workmanship within the specified warranty period. Manufacturer agrees to replace floor coverings that fail within specified warranty period due to excessive water vapor emissions through concrete slab. Failures include, but are not limited to, the following:
 1. Adhesives.
 2. Delamination or adhesive failure of floor covering systems, including epoxy and polyurethane resinous flooring systems.
- C. Warranty Period: 10 years from date of Substantial Completion.

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PART 2 - PRODUCTS

2.1 CONCRETE SEALERS

- A. Sealer: Penetrating sealer recommended by manufacturer for application to interior concrete traffic surfaces for the reduction of excess water vapor emissions from concrete slabs.
- B. Products: Subject to compliance with requirements, provide one of the following:
 - 1. Koester American Corporation. www.koesterusa.com.
 - a. VAP 1-2000 for application to green concrete.
 - b. VAP 1 pH for application to cured concrete
 - 2. Terasco
 - 3. Aquafin
- C. Topcoat: Sealing or finish coats.
 - 1. Resin: Epoxy or urethane.
 - 2. Type: Clear.
 - 3. Finish: Matte.
 - 4. Number of Coats: Two.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer and manufacturer's technical representative present, for compliance with requirements for condition of the concrete slab and other conditions affecting performance of water vapor reduction system.
 - 1. Manufacturer's technical representative shall identify number and location of test sites.
 - 2. Perform testing on freshly abraded concrete.
- B. Testing and Inspecting: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
- C. Moisture Testing: Anhydrous calcium chloride test, ASTM F 1869.
 - 1. Maintain temperature and humidity levels expected during normal occupancy or 65 to 85 degrees F and 40 to 60 percent relative humidity for 48 hours before performing test.
- D. Testing for alkalinity and contaminant: Perform tests recommended by manufacturer's technical representative.
- E. Submit results to Architect and manufacturer's technical representative.

3.2 PREPARATION

- A. Shot blast concrete slabs and remove all residue and loose material from slab.
- B. Repair defects, cracks, and open surface honeycombs.
- C. Clean concrete as recommended by manufacturer to remove dirt, oils, films, and other materials detrimental to sealer application.
- D. Remove reinforcing fibers from surface.
- E. Protect adjacent construction from overspray or splashing of sealer.

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3.3 APPLICATION

- A. General: Comply with manufacturer's written instructions and recommendations for application of products, including surface preparation.
- B. Concrete Sealer: Apply by brush, roller, or airless spray at manufacturer's recommended application rate.
- C. Topcoat: Apply topcoats in number indicated for flooring system and at spreading rates recommended in writing by manufacturer.
- D. Protect sealed concrete slab to prevent damage from active rain or topical water for a period of time recommended by manufacturer.

3.4 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
- B. Moisture Testing: Perform anhydrous calcium chloride test, ASTM F 1869. Report findings to Architect and manufacturer's technical representative.
- C. Reapply sealer, if required, to meet performance requirements.

END OF SECTION 033503

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Fayetteville, North Carolina
Gordon Johnson Architecture

AP#1808

July 15, 2019

SECTION 042000 - UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Concrete masonry units.
2. Concrete building brick.

1.2 DEFINITIONS

- A. CMU(s):** Concrete masonry unit(s).
- B. Reinforced Masonry:** Masonry containing reinforcing steel in grouted cells.

1.3 ACTION SUBMITTALS

- A. Product Data:** For each type of product.
- B. Shop Drawings:** For reinforcing steel. Detail bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315.

1.4 INFORMATIONAL SUBMITTALS

- A. Material Certificates:** For each type and size of product. For masonry units, include data on material properties.
- B. Mix Designs:** For each type of mortar and grout. Include description of type and proportions of ingredients.
1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91/C 91M for air content.
 2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

1.5 FIELD 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. Remove and replace unit masonry damaged by frost

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or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

- B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

PART 2 - PRODUCTS

2.1 UNIT MASONRY, GENERAL

- A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in the Contract Documents.
- B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work.
- C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.
 - 1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.

2.2 CONCRETE MASONRY UNITS

- A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
 - 1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
- B. CMUs: ASTM C 90.
 - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1900 psi.
 - 2. Density Classification: Lightweight
- C. Concrete Building Brick: ASTM C 55.
 - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2800 psi.
 - 2. Density Classification: Lightweight.

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2.3 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150/C 150M, Type I or II, except Type III may be used for cold-weather construction.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- D. Aggregate for Mortar: ASTM C 144.
 - 1. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
 - 2. White-Mortar Aggregates: Natural white sand or crushed white stone.
 - 3. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
- E. Aggregate for Grout: ASTM C 404, coarse.
- F. Epoxy Pointing Mortar: ASTM C 395, epoxy-resin-based material formulated for use as pointing mortar for glazed or pre-faced masonry units (and approved for such use by manufacturer of units); in color indicated or, if not otherwise indicated, as selected by Architect from manufacturer's colors.
- G. 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.
- H. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs containing integral water repellent from same manufacturer.
- I. Water: Potable.

2.4 REINFORCEMENT

- A. Uncoated-Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 706/A 706M where welding of rebar is required, Grade 60.
- B. Masonry-Joint Reinforcement, General: ASTM A 951/A 951M.
 - 1. Interior Walls: Hot-dip galvanized carbon steel.
 - 2. Exterior Walls: Hot-dip galvanized carbon steel.
 - 3. Wire Size for Side Rods: 0.187-inch diameter.
 - 4. Wire Size for Cross Rods: 0.148-inch diameter.
 - 5. Wire Size for Veneer Ties: 0.187-inch diameter.
 - 6. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
 - 7. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units.

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- C. Masonry-Joint Reinforcement for Single-Wythe Masonry: Ladder type with side rods and cross ties.
- D. Masonry-Joint Reinforcement for Multiwythe Masonry:
 - 1. Ladder type with one side rod at each face shell of hollow masonry units more than 4 inches wide, plus one side rod at each wythe of masonry 4 inches wide or less.
 - 2. Tab type, ladder design, with one side rod at each face shell of backing wythe and with rectangular tabs sized to extend at least halfway through facing wythe, but with at least 5/8-inch cover on outside face.
 - 3. Adjustable (two-piece) type, ladder design, with one side rod at each face shell of backing wythe and with separate adjustable ties with pintle-and-eye connections having a maximum horizontal play of 1/16 inch and maximum vertical adjustment of 1-1/4 inches. Size ties to extend at least halfway through facing wythe but with at least 5/8-inch cover on outside face.

TIES AND ANCHORS

- E. General: Ties and anchors shall extend at least 1-1/2 inches into veneer but with at least a 5/8-inch cover on outside face.
- F. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:
 - 1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M, with ASTM A 153/A 153M, Class B-2 coating.
 - 2. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with ASTM A 153/A 153M, Class B coating.
 - 3. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- G. Individual Wire Ties: Rectangular units with closed ends and not less than 4 inches wide.
 - 1. Wire: Fabricate from 3/16-inch diameter, hot-dip galvanized-steel wire.
- H. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
 - 1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch diameter, hot-dip galvanized-steel wire.
 - 2. Tie Section: Triangular-shaped wire tie made from 0.187-inch diameter, hot-dip galvanized-steel wire.
- I. Adjustable Anchors for Connecting to Concrete: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
 - 1. Connector Section: Dovetail tabs for inserting into dovetail slots in concrete and attached to tie section; formed from 0.060-inch thick steel sheet, galvanized after fabrication.

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2. Tie Section: Triangular-shaped wire tie made from 0.187-inch diameter, hot-dip galvanized-steel wire.

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.
- B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
- C. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D 226/D 226M, Type I (No. 15 asphalt felt).

2.6 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
 1. Do not use calcium chloride in mortar or grout.
 2. Use portland cement-lime mortar.
 3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in 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 Unit Masonry: Comply with ASTM C 270, Property Specification. Provide the following types of mortar for applications stated unless another type is indicated.
 1. For masonry below grade or in contact with earth, use Type M.
 2. For reinforced masonry, use Type S.
 3. For mortar parge coats, use Type S.
- D. Grout for Unit Masonry: Comply with ASTM C 476.
 1. Use coarse grout that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.
 2. Proportion grout in accordance with ASTM C 476 for 3000 psi 28-day compressive strength.
 3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143/C 143M.

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PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- B. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.

3.2 TOLERANCES

A. Dimensions and Locations of Elements:

- 1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch or minus 1/4 inch.
- 2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch.
- 3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:

- 1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet, or 1/2-inch maximum.
- 2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
- 3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
- 4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
- 5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.

C. Joints:

- 1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
- 2. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
- 3. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch.

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3.3 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.
- C. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- D. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.
- E. Grout all cells with reinforcing solid. Grout all cells solid below grade.

3.4 MORTAR BEDDING AND JOINTING

- A. Lay CMUs as follows:
 - 1. Bed face shells in mortar and make head joints of depth equal to bed joints.
 - 2. Bed webs in mortar in all courses of piers, columns, and pilasters.
 - 3. Bed webs in mortar in grouted masonry, including starting course on footings.
 - 4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.
- B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
- C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
- D. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

3.5 MASONRY-JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches .
 - 1. Space reinforcement not more than 16 inches o.c.
 - 2. Space reinforcement not more than 8 inches o.c. in foundation walls.
 - 3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings in addition to continuous reinforcement.

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- B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated. Continue all bond beam reinforcing thru control joints.
- C. Provide continuity at wall intersections by using prefabricated T-shaped units.
- D. Provide continuity at corners by using prefabricated L-shaped units.

3.6 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

- A. Anchor masonry to structural steel and concrete, where masonry abuts or faces structural steel or concrete, to comply with the following:
 - 1. Provide an open space not less than 1/2 inch wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
 - 2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
 - 3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

3.7 REINFORCED UNIT MASONRY INSTALLATION

- A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
 - 1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
 - 2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and that of other loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.
- C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
 - 1. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
 - 2. Limit height of vertical grout pours to not more than 4.67 ft.

3.8 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform

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tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

- B. Inspections: Special inspections according to Schedule of Structural Special Inspection Services.
 - 1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
 - 2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
 - 3. Place grout only after inspectors have verified proportions of site-prepared grout.
- C. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.
- D. Clay Masonry Unit Test: For each type of unit provided, according to ASTM C 67 for compressive strength.
- E. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

3.9 REPAIRING, POINTING, AND CLEANING

- A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.

3.10 MASONRY WASTE DISPOSAL

- A. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.
 - 1. Do not dispose of masonry waste as fill within 18 inches of finished grade.
- B. Masonry Waste Recycling: Return broken CMUs not used as fill to manufacturer for recycling.
- C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 042000

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SECTION 051200 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Structural steel.
2. Grout.

B. Related Requirements:

1. Section 051213 "Architecturally Exposed Structural Steel Framing" for additional requirements for architecturally exposed structural steel.

1.2 DEFINITIONS

- A. Structural Steel:** Elements of the structural frame indicated on Drawings and as described in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

1.3 PREINSTALLATION MEETINGS

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

1.4 ACTION SUBMITTALS

- A. Product Data:** For each type of product.
- B. Shop Drawings:** Show fabrication of structural-steel components.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data:** For Installer and Fabricator.
- B. Welding certificates.**
- C. Mill test reports** for structural steel, including chemical and physical properties.
- D. Source quality-control reports.**
- E. Field quality-control and special inspection reports.**

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1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.
- B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category CSE.
- C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- D. Comply with applicable provisions of the following specifications and documents:
 - 1. AISC 303.
 - 2. AISC 360.
 - 3. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Connections: Provide details of simple shear connections required by the Contract Documents to be selected or completed by structural-steel fabricator to withstand loads indicated and comply with other information and restrictions indicated.
 - 1. Select and complete connections using schematic details indicated and AISC 360.
 - 2. Use Allowable Stress Design; data are given at service-load level.
- B. Moment Connections: Type FR, fully restrained.
- C. Construction: [Combined system of moment frame and braced frame] [Combined system of braced frame and shear walls].

2.2 STRUCTURAL-STEEL MATERIALS

- A. W-Shapes: ASTM A 992, ASTM A 572, Grade 50.
- B. Channels and Angles: ASTM A 36.
- C. Plate and Bar: ASTM A 36.
- D. Cold-Formed Hollow Structural Sections: ASTM A 500/A 500M, Grade B, structural tubing.
- E. Steel Pipe: ASTM A 53/A 53M, Type E or Type S, Grade B.
- F. Welding Electrodes: Comply with AWS requirements.

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2.3 BOLTS, CONNECTORS, AND ANCHORS

- A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers; all with plain finish.
- B. Zinc-Coated High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers.
 - 1. Finish: Hot-dip zinc coating.
- C. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.
- D. Unheaded Anchor Rods: [ASTM F 1554, Grade 36] [ASTM F 1554, Grade 55, weldable].
 - 1. Configuration: Straight.
 - 2. Finish: [Plain] [Hot-dip zinc coating, ASTM A 153/A 153M, Class C].
- E. Headed Anchor Rods: [ASTM F 1554, Grade 36] [ASTM F 1554, Grade 55, weldable], straight.
 - 1. Finish: [Plain] [Hot-dip zinc coating, ASTM A 153/A 153M, Class C]
- F. Threaded Rods: ASTM A 36.
 - 1. Finish: [Plain] [Hot-dip zinc coating, ASTM A 153/A 153M, Class C].

2.4 PRIMER

- A. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

2.5 GROUT

- A. Metallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, metallic aggregate grout, mixed with water to consistency suitable for application and a 30-minute working time.
- B. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

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2.6 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," and to AISC 360.
- B. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

2.7 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

2.8 SHOP PRIMING

- A. Shop prime steel surfaces except the following:
 - 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
 - 2. Surfaces to be field welded.
 - 3. Surfaces of high-strength bolted, slip-critical connections.
 - 4. Galvanized surfaces.
- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
 - 1. SSPC-SP 2, "Hand Tool Cleaning."
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

2.9 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.

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1. Fill vent and drain holes that will be exposed in the finished Work unless they will function as weep holes, by plugging with zinc solder and filing off smooth.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
- B. Baseplates and Bearing Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
 1. Set plates for structural members on wedges, shims, or setting nuts as required.
 2. Weld plate washers to top of baseplate where required.
 3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
 4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- C. Maintain erection tolerances of structural steel within AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."
- D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

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1. Level and plumb individual members of structure.
 2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
- E. Splice members only where indicated.
- F. Do not use thermal cutting during erection unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M.
- G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.
- H. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

3.4 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
 2. Remove backing bars or runoff tabs at architecturally exposed steel, back gouge, and grind steel smooth.
 3. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," for mill material.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform special inspection tests and inspections indicated below. Welding inspector to be a certified welding inspector (CWI).
1. Field Welded Connections: Continuously visually inspect all complete and partial joint penetration groove welds according to AWS D1.1/D1.1M. Continuously visually inspect all fillet welds greater than 5/16" according to AWS D1.1/D1.1M.
 - a. In addition to visual inspection, test all complete joint penetration groove welds according to AWS D1.1/D1.1M and the following inspection procedure:
 - 1) Ultrasonic Inspection: ASTM E 164.

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- B. Special Inspections: Owner will engage a qualified special inspector to perform special inspections in accordance with the Schedule of Structural Special Inspection Services and as indicated below:
 - 1. Special inspector to obtain Testing Agency testing reports. Verify completion of testing and compliance at locations required.
 - 2. In addition to visual inspection of shear connector welding, test and inspect field-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding as follows:
 - a. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
 - b. Conduct tests on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1/D1.1M.
- C. General Contractor is to correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

3.6 REPAIRS AND PROTECTION

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780.
- B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

END OF SECTION 051200

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SECTION 051213 - ARCHITECTURALLY EXPOSED STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes architecturally exposed structural-steel (AESS).
 - 1. Requirements in Section 051200 "Structural Steel Framing" also apply to AESS.

1.2 DEFINITIONS

- A. AESS: Structural steel designated as "architecturally exposed structural steel" or "AESS" in the Contract Documents.

1.3 PREINSTALLATION MEETINGS

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

1.4 ACTION SUBMITTALS

- A. Shop Drawings: Show fabrication of AESS components. Shop Drawings for structural steel may be used for AESS provided items of AESS are specifically identified and requirements below are met for AESS.
 - 1. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain. Indicate grinding, finish, and profile of welds.
 - 2. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD, or is accredited by the IAS Fabricator Inspection Program for Structural Steel (AC 172).
- B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category CSE.

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- C. Shop-Painting Applicators: Qualified according to AISC's Sophisticated Paint Endorsement P1, Endorsement P2, Endorsement P3, or SSPC-QP 3, "Standard Procedure for Evaluating Qualifications of Shop Painting Applicators."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Use special care in handling to prevent twisting, warping, nicking, and other damage. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
 - 1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.7 FIELD CONDITIONS

- A. Field Measurements: Where AESS is indicated to fit against other construction, verify actual dimensions by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 BOLTS, CONNECTORS, AND ANCHORS

- A. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, round-head assemblies, consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.
 - 1. Finish: Plain.

2.2 FILLER

- A. Filler: Polyester filler intended for use in repairing dents in automobile bodies.

2.3 PRIMER

- A. Primer: Comply with Section 099113 "Exterior Painting," Section 099123 "Interior Painting," and Section 099600 "High-Performance Coatings."
- B. Etching Cleaner for Galvanized Metal: MPI#25.
- C. Galvanizing Repair Paint: MPI#18.

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2.4 FABRICATION

- A. In addition to special care used to handle and fabricate AESS, comply with the following:
1. Fabricate with exposed surfaces smooth, square, and free of surface blemishes including pitting, rust, scale, and roughness.
 2. Grind sheared, punched, and flame-cut edges of AESS to provide smooth surfaces and edges.
 3. Fabricate AESS with exposed surfaces free of mill marks.
 4. Fabricate AESS with exposed surfaces free of seams to maximum extent possible.
 5. Remove blemishes by filling or grinding or by welding and grinding, before cleaning, treating, and shop priming.
 6. Fabricate with piece marks fully hidden in the completed structure or made with media that permits full removal after erection.
 7. Fabricate AESS to the tolerances specified in AISC 303 for steel that **[is] [is not]** designated AESS.
 8. Seal-weld open ends of hollow structural sections with 3/8-inch closure plates.
- B. Curved Members: Fabricate indicated members to curved shape by rolling to final shape in fabrication shop.
1. Distortion of webs, stems, outstanding flanges, and legs of angles shall not be visible from a distance of 20 feet under any lighting conditions.
 2. Tolerances for walls of hollow steel sections after rolling shall be approximately 1/2 inch.
- C. Coping, Blocking, and Joint Gaps: Maintain uniform gaps of 1/8 inch with a tolerance of 1/32 inch.
- D. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.
- E. Cleaning Corrosion-Resisting Structural Steel: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
- F. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.
1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
 2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
 3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.5 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

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1. Joint Type: Snug tightened.

- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work, and comply with the following:

1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding specified tolerances.
2. Use weld sizes, fabrication sequence, and equipment for AESS that limit distortions to allowable tolerances.
3. Provide continuous, sealed welds at angle to gusset-plate connections and similar locations where AESS is exposed to weather.
4. Provide continuous welds of uniform size and profile where AESS is welded.
5. Grind butt and groove welds flush to adjacent surfaces within tolerance of plus 1/16 inch, minus zero inch.
6. Make butt and groove welds flush to adjacent surfaces within tolerance of plus 1/16 inch, minus zero inch. Do not grind unless required for clearances or for fitting other components, or unless directed to correct unacceptable work.
7. Remove backing bars or runoff tabs; back-gouge and grind steel smooth.
8. At locations where welding on the far side of an exposed connection of AESS occurs, grind distortions and marking of the steel to a smooth profile aligned with adjacent material.
9. Make fillet welds oversize and grind to uniform profile with smooth face and transition.
10. Make fillet welds of uniform size and profile with exposed face smooth and slightly concave. Do not grind unless directed to correct unacceptable work.

2.6 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.

1. Do not quench or apply post-galvanizing treatments that might interfere with paint adhesion.
2. 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.
3. Galvanize lintels attached to structural-steel frame and located in exterior walls.

2.7 SHOP PRIMING

- A. Shop prime steel surfaces except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
2. Surfaces to be field welded.
3. Surfaces to be high-strength bolted with slip-critical connections.
4. Galvanized surfaces.

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B. Surface Preparation for Nongalvanized Steel:

1. SSPC-SP 3, "Power Tool Cleaning."

C. Preparing Galvanized Steel for Shop Priming: After galvanizing, thoroughly clean steel of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.

D. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify, with steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

1. Prepare a certified survey of bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

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

3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep AESS secure, plumb, and in alignment.

1. If possible, locate welded tabs for attaching temporary bracing and safety cabling where they will be concealed from view in the completed Work.

3.3 ERECTION

A. Set AESS accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

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1. Erect AECS to the tolerances specified in AISC 303 for steel that [is] [is not] designated AECS.

- B. Do not use thermal cutting during erection.

3.4 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened.
2. Orient bolt heads in same direction for each connection and to maximum extent possible in same direction for similar connections.

- B. Weld Connections: Comply with requirements in "Weld Connections" Paragraph in "Shop Connections" Article.

1. Remove backing bars or runoff tabs; back-gouge and grind steel smooth.
2. Remove erection bolts, fill holes, and grind smooth.
3. Fill weld access holes and grind smooth.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect AECS as specified in Section 051200 "Structural Steel Framing." The testing agency is not responsible for enforcing requirements relating to aesthetic effect.

- B. Architect will observe AECS in place to determine acceptability relating to aesthetic effect.

3.6 REPAIRS AND PROTECTION

- A. Remove welded tabs that were used for attaching temporary bracing and safety cabling and that are exposed to view in the completed Work. Grind steel smooth.

- 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 051213

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SECTION 052100 - STEEL JOIST FRAMING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. LH- series long-span steel joists.
 - 2. Joist accessories.
- B. Related Requirements:
 - 1. Section 051213 "Architecturally Exposed Structural Steel Framing" for additional requirements for architecturally exposed steel.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of joist, accessory, and product.
- B. Shop Drawings:
 - 1. Include layout, designation, number, type, location, and spacing of joists. Include joist schematic indicating web configuration for architecturally exposed joists.
 - 2. Include joining and anchorage details; bracing, bridging, and joist accessories; splice and connection locations and details; and attachments to other construction. Clearly indicate alignment and location of bridging that is architecturally exposed.

1.3 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Manufacturer certificates.
- C. Mill Certificates: For each type of bolt.
- D. Field quality-control reports.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A manufacturer certified by Steel Joist Institute (SJI) to manufacture joists complying with applicable standard specifications and load tables in SJI's "Specifications."

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1. Manufacturer's responsibilities include providing professional engineering services for designing special joists to comply with performance requirements.
- B. Welding Qualifications: Qualify field-welding procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

1. New Millennium Building Systems, LLC
2. Vulcraft; Nucor Vulcraft Group
3. Canam Steel Corporation; Canam Group, Inc.
4. Valley Joist

2.2 PERFORMANCE REQUIREMENTS

A. LONG-SPAN STEEL JOISTS

- B. Manufacture steel joists according to "Standard Specification for Longspan Steel Joists, LH-Series and Deep Longspan Steel Joists, DLH-Series" in SJI's "Specifications," with steel-angle top- and bottom-chord members; of joist type and end and top-chord arrangements as indicated.

2.3 PRIMERS

- A. Primer: SSPC-Paint 15, or manufacturer's standard shop primer complying with performance requirements in SSPC-Paint 15.

2.4 JOIST ACCESSORIES

- A. Bridging: Provide bridging anchors and number of rows of horizontal or diagonal bridging of material, size, and type required by SJI's "Specifications" for type of joist, chord size, spacing, and span. Furnish additional erection bridging if required for stability. Bridging requirements shown on structural drawings are to be considered minimums.
- B. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy hex steel structural bolts; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.
 1. Finish: Plain.
- C. Furnish miscellaneous accessories including splice plates and bolts required by joist manufacturer to complete joist assembly.

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2.5 CLEANING AND SHOP PAINTING

- A. Clean and remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories.
- B. Apply one coat of shop primer to joists and joist accessories.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Do not install joists until supporting construction is in place and secured.
- B. Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Specifications," joist manufacturer's written instructions, and requirements in this Section.
 - 1. Before installation, splice joists delivered to Project site in more than one piece.
 - 2. Space, adjust, and align joists accurately in location before permanently fastening.
 - 3. Install temporary bracing and erection bridging, connections, and anchors to ensure that joists are stabilized during construction.
- C. Field weld joists to supporting steel framework. Coordinate welding sequence and procedure with placement of joists. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
- D. Bolt joists to supporting steel framework using carbon-steel bolts.
- E. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at beams.

3.2 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform tasks according to the Schedule of Structural Special Inspection Services.

END OF SECTION 052100

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SECTION 053100 - STEEL DECKING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. 1.5 inch roof deck.
2. 2 inch deep architectural acoustical roof deck.
3. Composite floor deck.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of deck, accessory, and product indicated.

B. Shop Drawings:

1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

1.3 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Product Certificates: For each type of steel deck.

C. Evaluation reports. Manufacturer certification.

D. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer certified by Steel Deck Institute (SDI) to manufacture roof and composite deck complying with applicable standard specifications.

B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

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PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

2.2 ROOF DECK

- A. Manufacturers:
 - 1. New Millennium Building Systems, LLC
 - 2. Epic Metals Corporation
 - 3. Canam Steel Corporation
 - 4. Nucor Corp.
- B. Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:
 - 1. 1.5 inch deep roof decking is to be Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33 , G60 zinc coating. See plans for locations.
 - 2. Deck Profile: Type B (wide rib).
 - 3. Profile Depth: 1.5.
 - 4. Design Uncoated-Steel Thickness: 0.0358
- C. Architectural Acoustical Steel Roof Deck: Fabricate panels, with or without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 30, and with the following:
 - 1. Basis-of-Design Product: New Millennium Building Systems, LLC; Versa-Dek® 2 LS Acoustical.
 - 2. Galvanized and Shop-Primed Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33, minimum ASTM A 924 G60 zinc coating; cleaned, pretreated, and painted in accordance with New Millennium Building Systems standard for architectural acoustical deck.
 - 3. Profile Depth: 2 inches.
 - 4. Design Uncoated-Steel Thickness: 0.0474 inch.
 - 5. Span Condition: Triple span or more.
 - 6. Side Laps: Nestible.
 - 7. Acoustical Perforations: Versa-Dek® deck units with manufacturer's standard perforated bottom ribs.
 - 8. Sound-Absorbing Insulation: Manufacturer's standard premolded roll or strip of glass or mineral fiber.
 - 9. Lath: Manufacturer's standard premolded roll or strip of lath.

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10. Acoustical Performance: NRC 0.65, tested according to ASTM C 423.

COMPOSITE FLOOR DECK

- D. Manufacturers:
1. New Millennium Building Systems, LLC
 2. Epic Metals Corporation
 3. Canam Steel Corporation
 4. Nucor Corp.
- E. Composite Floor Deck: Fabricate panels, with integrally embossed or raised pattern ribs and interlocking side laps, to comply with "SDI Specifications and Commentary for Composite Steel Floor Deck," in SDI Publication No. 31, with the minimum section properties indicated, and with the following:
1. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33, G60 zinc coating.
 2. Profile Depth: 2 inches.
 3. Design Uncoated-Steel Thickness: 0.0358 inch

2.3 ACCESSORIES

- A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- B. Mechanical Fasteners: Corrosion-resistant, self-drilling, self-threading screws.
- C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.
- D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.
- E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- F. Flat Sump Plates: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck. For drains, cut holes in the field.
- G. Galvanizing Repair Paint: ASTM A 780.
- H. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

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PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section.
- B. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- C. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- D. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
- E. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.
- F. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and mechanically fasten flanges to top of deck. Space mechanical fasteners not more than 12 inches apart with at least one fastener at each corner.
- G. Miscellaneous Roof-Deck Accessories: Install miscellaneous plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld or mechanically fasten to substrate to provide a complete deck installation.
 - 1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.
- H. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations unless otherwise indicated.
- I. Floor-Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of deck.

3.2 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform tasks according to the Schedule of Structural Special Inspection Services.

3.3 PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

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- B. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on surface of prime-painted deck immediately after installation, and apply repair paint.

END OF SECTION 053100

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SECTION 055000 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Miscellaneous steel framing and supports.
2. Metal ladders.
3. Metal floor plate and supports.
4. Elevator pit sump covers.
5. Miscellaneous steel trim.
Metal bollards.
6. Loose bearing and leveling plates.

1.2 ACTION SUBMITTALS

A. Product Data: For the following:

1. Metal nosings and treads.
2. Paint products.
3. Grout.

B. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

C. Delegated-Design Submittal: For ladders, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design ladders.

B. Structural Performance of Aluminum Ladders: Aluminum ladders, including landings, shall withstand the effects of loads and stresses within limits and under conditions specified in ANSI A14.3.

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- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

- 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- C. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.
- D. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.
- E. Steel Tubing: ASTM A 500/A 500M, cold-formed steel tubing.
- F. Steel Pipe: ASTM A 53/A 53M, Standard Weight (Schedule 40) unless otherwise indicated.
- G. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.
- H. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.
- I. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.
- J. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.
- K. Bronze Extrusions: ASTM B 455, Alloy UNS No. C38500 (extruded architectural bronze).
- L. Bronze Castings: ASTM B 584, Alloy UNS No. C83600 (lead red brass) or No. C84400 (lead semired brass).
- M. Nickel Silver Castings: ASTM B 584, Alloy UNS No. C97600 (20 percent lead nickel bronze).

2.3 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.

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1. Provide stainless-steel fasteners for fastening aluminum.
 2. Provide stainless-steel fasteners for fastening stainless steel.
 3. Provide stainless-steel fasteners for fastening nickel silver.
 4. Provide bronze fasteners for fastening bronze.
- B. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.
- C. Post-Installed Anchors: Torque-controlled expansion anchors.
1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.
 2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.
- D. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches by length indicated with anchor straps or studs not less than 3 inches long at not more than 8 inches o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B 633, Class Fe/Zn 5, as needed for fastening to inserts.

2.4 MISCELLANEOUS MATERIALS

- A. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- B. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- 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. Concrete: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3000 psi.

2.5 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Use connections that maintain structural value of joined pieces.

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- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges. Remove sharp or rough areas on exposed surfaces.
- C. Weld corners and seams continuously to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended.
- D. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Locate joints where least conspicuous.
- E. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- F. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors not less than 8 inches from ends and corners of units and 24 inches o.c.

2.6 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
- C. Fabricate steel girders for wood frame construction from continuous steel shapes of sizes indicated.
 - 1. Where wood nailers are attached to girders with bolts or lag screws, drill or punch holes at 24 inches o.c.
- D. Fabricate steel pipe columns for supporting wood frame construction from steel pipe with steel baseplates and top plates as indicated. Drill or punch baseplates and top plates for anchor and connection bolts and weld to pipe with fillet welds all around. Make welds the same size as pipe wall thickness unless otherwise indicated.

2.7 METAL LADDERS

- A. General:
 - 1. Comply with ANSI A14.3, except for elevator pit ladders.

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2. For elevator pit ladders, comply with ASME A17.1/CSA B44.

B. Steel Ladders:

1. Space side rails 18 inches apart unless otherwise indicated.
2. Siderails: Continuous, 3/8-by-2-1/2-inch steel flat bars, with eased edges.
3. Rungs: 1-inch- diameter steel bars.
4. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
5. Galvanize exterior ladders, including brackets.

C. Aluminum Ladders:

1. Space siderails 18 inches apart unless otherwise indicated.
2. Siderails: Continuous extruded-aluminum channels or tubes, not less than 2-1/2 inches deep, 3/4 inch wide, and 1/8 inch thick.
3. Rungs: Extruded-aluminum tubes, not less than 3/4 inch deep and not less than 1/8 inch thick, with ribbed tread surfaces.

2.8 ELEVATOR PIT SUMP COVERS

- A. Fabricate from 1/8-inch rolled-steel floor plate with four 1-inch- diameter holes for water drainage and for lifting.

2.9 MISCELLANEOUS STEEL TRIM

- A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
- C. Galvanize exterior miscellaneous steel trim.

2.10 METAL BOLLARDS

- A. Fabricate metal bollards from Schedule 80 steel pipe.
 1. Cap bollards with 1/4-inch- thick steel plate.
- B. Fabricate bollards with 3/8-inch- thick steel baseplates for bolting to concrete slab. Drill baseplates at all four corners for 3/4-inch anchor bolts.
- C. Fabricate sleeves for bollard anchorage from steel pipe or tubing with 1/4-inch- thick steel plate welded to bottom of sleeve.

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- D. Prime bollards with zinc-rich primer.

2.11 LOOSE BEARING AND LEVELING PLATES

- A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.

2.12 LOOSE STEEL LINTELS

- A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated.
- B. Galvanize loose steel lintels located in exterior walls.

2.13 STEEL WELD PLATES AND ANGLES

- A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

2.14 FINISHES, GENERAL

- A. Finish metal fabrications after assembly.

2.15 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.
- B. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

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- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3.2 INSTALLING METAL BOLLARDS

- A. Fill metal-capped bollards solidly with concrete and allow concrete to cure seven days before installing.
- B. Anchor bollards to existing construction with expansion anchors. Provide four 3/4-inch bolts at each bollard unless otherwise indicated.
- C. Anchor bollards in concrete with pipe sleeves preset and anchored into concrete. Fill annular space around bollard solidly with nonshrink grout.
- D. Anchor bollards in place with concrete footings. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.
- E. Fill bollards solidly with concrete, mounding top surface to shed water.

3.3 INSTALLING BEARING AND LEVELING PLATES

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.
- B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with nonshrink grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

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3.4 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
- 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 055000

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SECTION 055813 - COLUMN COVERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes: column covers including panels, mounting channel, blocking, trims and reveals. Column covers come “ready to install”. Internal fasteners shall be concealed type.

1.2 REFERENCES

- A. ASTM E84 – Surface Burning Characteristics of Building Materials.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product, including finishing materials.
- B. Shop Drawings: Show fabrication and installation details for column covers.
- C. Samples: For each type of exposed finish required, prepared on 4-inch-square Samples of metal of same thickness and material indicated for the Work.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications
 - 1. Minimum 10 years experience in the manufacturer of architectural surface materials.
 - 2. Minimum 10 years experience in the fabrication of column covers.
- B. Installer Qualifications
 - 1. Minimum three years experience in the installation of column covers.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to installation site in manufacturer’s original packaging. Handle products in accordance with manufacturer’s instructions. Store in dry, secure location, protected against sunlight and excessive heat. Protect finished surfaces with strippable film.

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1.6 WARRANTY

- A. Provide manufacturer's standard warranty.
 - 1. Warranty terms: one year against defects in materials and workmanship.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Basis-of-Design Manufacturer: Forms + Surfaces, 30 Pine Street, Pittsburg, PA 15223.
 - 1. Alternate Manufacturers:
 - a. Centria, 1005 Beaver Grade Road, Moon Township, PA 15108.
 - b. Pac-Clad Peterson, 1005 Tonne Road, Elk Grove Village IL 60007

2.2 ARCHITECTURAL METAL COLUMN COVERS

- A. General
 - 1. Provide column cover panels with mounting channels, blocking and reveals.
 - 2. Configuration: Basis-of-Design Manufacturer column coves. See drawings for mounting channel and joint spacing.
- B. Column Body Materials
 - 1. Stainless Steel Panels
 - a. Material: Stainless steel.
 - b. Finish: Basis-of-Design Manufacturer Sandstone
 - c. Fire rating: NFPA and IBC class A fire rated and UBC class 1 fire rated.
- C. Reveals
 - 1. Material: to match column body.
 - 2. Finish: to match column body.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect wall finishes, fixtures and equipment from damage caused by work of this section.

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3.2 INSTALLATION

- A. Install in accordance with Basis-of-Design Manufacturer's instructions.

3.3 CLEANING AND PROTECTION

- A. Remove strippable film. Clean exposed surfaces in accordance with manufacturer's instructions.
- B. Protect exposed surfaces from damage by subsequent construction.

END OF SECTION 055813

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SECTION 057300 - DECORATIVE METAL RAILINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Stainless-steel decorative railings with decorative glass infill.

1.2 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Manufacturer's product lines of railings assembled from standard components.
 - 2. Grout, anchoring cement, and paint products.
- B. Shop Drawings: Include plans, elevations, sections, and attachment details.
- C. 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. Welded connections.
 - 4. Assembled Samples of railing systems, made from full-size components, including top rail, post, handrail, and infill. Show method of finishing members at intersections. Samples need not be full height.
- D. Welding certificates.
- E. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For professional engineer.
- B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, according to ASTM E 894 and ASTM E 935.
- C. Preconstruction test reports.
- D. Evaluation Reports: For post-installed anchors, from ICC-ES.

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1.4 QUALITY ASSURANCE

- A. Fabricator Qualifications: A firm experienced in producing and installing decorative metal railings similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
 - 1. A firm that has specialized in the manufacture of decorative metal railings of the types specified and has been in standard production of the type of railings specified for at least 10 years.
- B. Source Limitations: Obtain each type of railing through one source from a single manufacturer.
- C. Welding: Qualify procedures and personnel according to the following:
 - 1. AWS D1.2, "Structural Welding Code--Aluminum."
 - 2. AWS D1.6, "Structural Welding Code--Stainless Steel."
- D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Mockup shall consist of a full floor to floor run (inside and outside) consisting of:
 - a. Interior stinger.
 - b. Exterior stringer.
 - c. Main landing.
 - d. Intermediate landing.
 - e. Approved mockup may be incorporated into completed work.

1.5 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Owner will engage a qualified testing agency to perform preconstruction testing on laboratory mockups. Payment for these services will be made by Owner. Retesting of products that fail to meet specified requirements shall be done at Contractor's expense.
 - 1. Build laboratory mockups at testing agency facility; use personnel, materials, and methods of construction that will be used at Project site.
 - 2. Test railings according to ASTM E 894 and ASTM E 935.

PART 2 - PRODUCTS

2.1 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.
- 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:

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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. Uniform load of 25 lbf/ft applied horizontally.
 - c. Infill load and other loads need not be assumed to act concurrently.

2.2 DECORATIVE GLASS RAILING SYSTEM

- A. Basis-of-Design Product: Provide decorative glass railing system by HDI Railings or comparable product by one of the following:
 1. Architectural Railings & Grilles.
 2. HDI Railings (Basis-of-Design).
 - a. Product: "Circum"; 42-inch high guardrail with 36-inch high offset handrail.
 3. Livers Bronze Company.
- B. Modular Railing System: Non-welded assemblies using machined parts and other collateral materials designed with interchangeable components within the railing system.
- C. System style and components:
 1. Stainless-steel saddles and round posts.
 2. Stainless-steel fittings.
 3. Clear, tempered glass, 3/8" thick, all edges eased and polished.
 4. In-Line Top Cap: Stainless-steel with No. 6 finish.

2.3 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipment.
- 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 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.

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2.4 STAINLESS-STEEL FINISHES

- A. All machined stainless steel fittings will receive a # 6 polish.
- B. All stainless steel pipe and tubing to receive a #6 polish.
- C. Remove tool and die marks and stretch lines or blend into finish.
- D. Grind and polish surfaces to produce uniform finish indicated, free of cross scratches.
- E. Run grain of directionally textured finishes with long dimension of each piece.
- F. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

PART 3 - EXECUTION

3.1 INSTALLATION

- 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. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
 - 2. 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. Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout.
- E. Anchor posts to metal surfaces with flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members.
- F. Secure wall brackets and railing end flanges to building construction as follows:
 - 1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
 - 2. For steel-framed partitions, use hanger or lag bolts set into fire-retardant-treated wood backing between studs. Coordinate with stud installation to locate backing members.

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- G. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

END OF SECTION 057300

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SECTION 061053 - MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Wood blocking, cants, and nailers.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product.

1.3 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For the following, from ICC-ES:
 - 1. Preservative-treated wood.
 - 2. Fire-retardant-treated wood.
 - 3. Power-driven fasteners.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. For exposed lumber indicated to receive a stained or natural finish, omit grade stamp and provide certificates of grade compliance issued by grading agency.
 - 3. Dress lumber, S4S, unless otherwise indicated.
- B. Maximum Moisture Content of Lumber: 19 percent unless otherwise indicated.

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2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWP A U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat all miscellaneous carpentry unless otherwise indicated.

2.3 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 - 1. Blocking.
 - 2. Nailers.
 - 3. Rooftop equipment bases and support curbs.
 - 4. Cants.
- B. Dimension Lumber Items: Construction or No. 2 grade lumber of any species.

2.4 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M or of Type 304 stainless steel.
- B. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

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PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry accurately to other construction. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- C. Do not splice structural members between supports unless otherwise indicated.
- D. Comply with AWWA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
- E. Securely attach 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.
 - 2. ICC-ES evaluation report for fastener.

END OF SECTION 061053

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SECTION 064116 - PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Plastic-laminate-faced architectural cabinets.
2. Wood furring, blocking, shims, and hanging strips for installing plastic-laminate-faced architectural cabinets unless concealed within other construction before cabinet installation.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product, including panel products high-pressure decorative laminate adhesive for bonding plastic laminate and cabinet hardware and accessories.
- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
- C. Samples:
 1. Plastic laminates, for each color, pattern, and surface finish.
 2. Thermoset decorative panels, for each color, pattern, and surface finish.

1.3 INFORMATIONAL SUBMITTALS

- A. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

1.4 QUALITY ASSURANCE

- A. Fabricator Qualifications: Certified participant in AWI's Quality Certification Program.
- B. Installer Qualifications: Certified participant in AWI's Quality Certification Program.

1.5 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

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PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of architectural plastic-laminate cabinets indicated for construction, finishes, installation, and other requirements.
 - 1. Provide labels and certificates from AWI certification program indicating that woodwork, including installation, complies with requirements of grades specified.
- B. Grade: Premium.
- C. Type of Construction: Face frame.
- D. Cabinet, Door, and Drawer Front Interface Style: Full overlay.
- E. Reveal Dimension: 1/2 inch.
- F. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by woodwork quality standard.
- G. Laminate Cladding for Exposed Surfaces:
 - 1. Horizontal Surfaces: Grade HGL.
 - 2. Postformed Surfaces: Grade HGP.
 - 3. Vertical Surfaces: Grade VGS.
 - 4. Edge Banding for Cabinet Doors and Drawers: 3 mm PVC.
 - 5. Pattern Direction: Vertically for drawer fronts, doors, and fixed panels.
- H. Materials for Semiexposed Surfaces:
 - 1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, NEMA LD 3, Grade VGS.
 - 2. Drawer Backs: Thermoset decorative panels with PVC or polyester edge banding.
 - 3. Drawer Bottoms: Thermoset decorative panels.
- I. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
 - 1. As indicated by on finish schedule.

2.2 WOOD MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.

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1. Wood Moisture Content: 8 to 13 percent.
- B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.
 1. Medium-Density Fiberboard: ANSI A208.2, Grade 130.
 2. Particleboard: ANSI A208.1, Grade M-2.
 3. Softwood Plywood: DOC PS 1, medium-density overlay.
 4. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1.
 5. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for test methods 3.3, 3.4, 3.6, 3.8, and 3.10.

2.3 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets except for items specified in Section 087111 "Door Hardware (Descriptive Specification)."
- B. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 100 degrees of opening, self-closing.
- C. Back-Mounted Pulls: BHMA A156.9, B02011.
- D. Hardware: As indicated on Drawings.
- E. Catches: Magnetic catches, BHMA A156.9, B03141.
- F. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081.
- G. Shelf Rests: BHMA A156.9, B04013; metal.
- H. Drawer Slides: BHMA A156.9.
 1. Grade 1 and Grade 2: Side mounted and extending under bottom edge of drawer; full-extension type; zinc-plated steel with polymer rollers.
 2. Grade 1HD-100 and Grade 1HD-200: Side mounted; full-extension type; zinc-plated-steel ball-bearing slides.
 3. For drawers not more than 3 inches high and not more than 24 inches wide, provide Grade 2.
 4. For drawers more than 3 inches high but not more than 6 inches high and not more than 24 inches wide, provide Grade 1.
 5. For drawers more than 6 inches high or more than 24 inches wide, provide Grade 1HD-100.
 6. For computer keyboard shelves, provide Grade 1.
 7. For trash bins not more than 20 inches high and 16 inches wide, provide Grade 1HD-100.

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- I. Plastic Slides for Sliding Glass Doors: BHMA A156.9, B07063.
- J. Door Locks: BHMA A156.11, E07121.
- K. Drawer Locks: BHMA A156.11, E07041.
- L. Door and Drawer Silencers: BHMA A156.16, L03011.
- M. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
 - 1. Satin Stainless Steel: BHMA 630.

2.4 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.
- C. Adhesive for Bonding Plastic Laminate: Unpigmented contact cement.
 - 1. Adhesive for Bonding Edges: Hot-melt adhesive.

2.5 FABRICATION

- A. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
- B. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
- C. Install glass to comply with applicable requirements in Section 088000 "Glazing" and in GANA's "Glazing Manual." For glass in wood frames, secure glass with removable stops.

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PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition cabinets to average prevailing humidity conditions in installation areas.

3.2 INSTALLATION

- A. Grade: Install cabinets to comply with same grade as item to be installed.
- B. Install cabinets level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
- C. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- D. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork.
- E. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
 - 1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
 - 2. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with No. 10 wafer-head screws sized for not less than 1-1/2-inch penetration into wood framing, blocking, or hanging strips.

END OF SECTION 064116

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SECTION 071416 - COLD FLUID-APPLIED WATERPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Polyurethane waterproofing.

1.2 PREINSTALLATION MEETINGS

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

1.3 ACTION SUBMITTALS

- ##### **A. Product Data:** For each type of product.

1.4 INFORMATIONAL SUBMITTALS

- ##### **A. Sample warranty.**

1.5 QUALITY ASSURANCE

- ##### **A. Installer Qualifications:** An entity that employs installers and supervisors who are trained and approved by waterproofing manufacturer.

1.6 WARRANTY

- ##### **A. Manufacturer's Special Warranty:** Manufacturer agrees to repair or replace waterproofing that fails in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SINGLE-COMPONENT POLYURETHANE WATERPROOFING

- ##### **A. Single-Component, Modified Polyurethane Waterproofing:** ASTM C 836/C 836M and coal-tar free.

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1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. BASF Corporation; Construction Systems.
 - b. Carlisle Coatings & Waterproofing Inc.
 - c. Tremco Incorporated.

2.2 AUXILIARY MATERIALS

- A. Primer: Manufacturer's standard primer, sealer, or surface conditioner; factory-formulated acrylic latex, polyurethane, or epoxy.
- B. Sheet Flashing: 50-mil-minimum, nonstaining, uncured sheet neoprene.
 1. Adhesive: Manufacturer's recommended contact adhesive.
- C. Membrane-Reinforcing Fabric: Manufacturer's recommended fiberglass mesh or polyester fabric.
- D. Joint Reinforcing Strip: Manufacturer's recommended fiberglass mesh or polyester fabric.
- E. Joint Sealant: Multicomponent polyurethane sealant, compatible with waterproofing; and as recommended by manufacturer for substrate and joint conditions.
 1. Backer Rod: Closed-cell polyethylene foam.

2.3 PROTECTION COURSE

- A. Protection Course: ASTM D 6506, semirigid sheets of fiberglass or mineral-reinforced-asphaltic core, pressure laminated between two asphalt-saturated fibrous liners and as follows:
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Soprema, Inc.
 - b. W. R. Meadows, Inc.
 2. Thickness: 1/8 inch, nominal, for vertical applications; 1/4 inch, nominal, elsewhere.
 3. Adhesive: Rubber-based solvent type recommended in writing by waterproofing manufacturer.

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PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.
- B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.
- C. Close off deck drains and other deck penetrations to prevent spillage and migration of waterproofing fluids.
- D. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, acid residues, and other penetrating contaminants or film-forming coatings from concrete.
- E. Remove fins, ridges, and other projections, and fill honeycomb, aggregate pockets, holes, and other voids.
- F. Prepare surfaces at terminations and penetrations through waterproofing and at expansion joints, drains, sleeves, and corners according to waterproofing manufacturer's written instructions and to recommendations in ASTM C 898/C 898M and ASTM C 1471.
- G. Apply waterproofing in two separate applications, and embed a joint reinforcing strip in the first preparation coat when recommended by waterproofing manufacturer.
- H. Prepare, treat, rout, and fill joints and cracks in substrate according to waterproofing manufacturer's written instructions and to recommendations in ASTM C 898/C 898M and ASTM C 1471. Before coating surfaces, remove dust and dirt from joints and cracks according to ASTM D 4258.
- I. Install sheet flashing and bond to deck and wall substrates where required according to waterproofing manufacturer's written instructions.

3.2 WATERPROOFING APPLICATION

- A. Apply waterproofing according to manufacturer's written instructions and to recommendations in ASTM C 898/C 898M and ASTM C 1471.
- B. Install protection course with butted joints over waterproofing before starting subsequent construction operations.
 - 1. For horizontal applications, install protection course loose laid over fully cured membrane.
 - 2. For vertical applications, set protection course in nominally cured membrane, which will act as an adhesive. If membrane cures before application of protection course, use adhesive.

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3.3 PROTECTION

- A. Do not permit foot or vehicular traffic on unprotected membrane.
- B. Protect waterproofing from damage and wear during remainder of construction period.
- C. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

END OF SECTION 071416

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SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Extruded polystyrene foam-plastic board.
2. Polyisocyanurate foam-plastic board.
3. Glass-fiber blanket.
4. Glass-fiber board.
5. Spray Insulation.

1.2 ACTION SUBMITTALS

- ##### A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

- ##### A. Product test reports.
- ##### B. Research reports.

PART 2 - PRODUCTS

2.1 EXTRUDED POLYSTYRENE FOAM-PLASTIC BOARD

- ##### A. Extruded polystyrene boards in this article are also called "XPS boards."
- ##### B. Extruded Polystyrene Board, Type X: ASTM C 578, Type X, 15-psi minimum compressive strength; unfaced; maximum flame-spread and smoke-developed indexes of 25 and 450, respectively, per ASTM E 84.
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. Dow Chemical Company (The).
 - b. Owens Corning.

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2. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.

2.2 POLYISOCYANURATE FOAM-PLASTIC BOARD

- A. Polyisocyanurate Board, Foil Faced: ASTM C 1289, foil faced, Type I, Class 1 or 2.

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. Atlas Roofing Corporation.
 - b. Dow Chemical Company (The).
 - c. Firestone Building Products.
2. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.

2.3 GLASS-FIBER BLANKET

- A. Glass-Fiber Blanket, Unfaced: 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.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. CertainTeed Corporation.
 - b. Johns Manville; a Berkshire Hathaway company.
 - c. Owens Corning.

2.4 GLASS-FIBER BOARD

- A. Glass-Fiber Board, Unfaced: ASTM C 612, Type IA; unfaced, with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84, passing ASTM E 136 for combustion characteristics. Nominal density of 2.25 lb/cu. ft., thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. CertainTeed Corporation.
 - b. Johns Manville; a Berkshire Hathaway company.
 - c. Owens Corning.

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2.5 SPRAY INSULATION

- A. Self-Supported, Spray-Applied Cellulosic Insulation: ASTM C 1149, Type I (materials applied with liquid adhesive; suitable for either exposed or enclosed applications, chemically treated for flame-resistance, processing, and handling characteristics).
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide International Cellulose Corporation or a comparable product by one of the following:
 - a. International Cellulose Corporation; K-13 (Basis-of-Design).
 - b. Thermacoustic; TC-417.
 - c. Or approved equal.
 - 2. Color: White and as approved by Architect.
 - a. Surfaces will be painted at a later date, to be determined.
 - b. Mock-Up: Apply 100 square feet representative sample to be reviewed by Architect prior to proceeding.”

2.6 ACCESSORIES

- A. Insulation for Miscellaneous Voids:
 - 1. Glass-Fiber Insulation: ASTM C 764, Type II, loose fill; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E 84.
 - 2. Spray Polyurethane Foam Insulation: ASTM C 1029, Type II, closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.
- B. Insulation Anchors, Spindles, and Standoffs: As recommended by manufacturer.
- C. Adhesive for Bonding Insulation: Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications.
- 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. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

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- D. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

3.2 INSTALLATION OF SLAB INSULATION

- A. On vertical slab edge and foundation surfaces, set insulation units using manufacturer's recommended adhesive according to manufacturer's written instructions.
 - 1. If not otherwise indicated, extend insulation a minimum of 24 inches below exterior grade line.
- B. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.
 - 1. If not otherwise indicated, extend insulation a minimum of 48 inches in from exterior walls.

3.3 INSTALLATION OF FOUNDATION WALL INSULATION

- A. Butt panels together for tight fit.
- B. Anchor Installation: Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors.
- C. Adhesive Installation: Install with adhesive or press into tacky waterproofing or dampproofing according to manufacturer's written instructions.

3.4 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

- A. 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.
 - 4. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
- B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:

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1. Glass-Fiber Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft..
2. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

3.5 INSTALLATION OF CURTAIN-WALL INSULATION

- A. Install board insulation in curtain-wall construction according to curtain-wall manufacturer's written instructions.
 1. Hold insulation in place by securing metal clips and straps or integral pockets within window frames, spaced at intervals recommended in writing by insulation manufacturer to hold insulation securely in place without touching spandrel glass. Maintain cavity width of dimension indicated on Drawings between insulation and glass.
 2. Install insulation to fit snugly without bowing.

END OF SECTION 072100

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SECTION 072119 - FOAMED-IN-PLACE INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Closed-cell spray polyurethane foam.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Research reports.

PART 2 - PRODUCTS

2.1 CLOSED-CELL SPRAY POLYURETHANE FOAM

- A. Closed-Cell Spray Polyurethane Foam: ASTM C 1029, Type II, minimum density of 1.5 lb/cu. ft. and minimum aged R-value at 1-inch thickness of 6.2 deg F x h x sq. ft./Btu at 75 deg F.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. BASF Corporation; SPF.
 - b. CertainTeed Corporation.
 - c. Dow Chemical Company (The).
 2. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 450 or less.

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3. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with insulation manufacturer's written instructions applicable to products and applications.
- B. Spray insulation to envelop entire area to be insulated and fill voids.
- C. Apply in multiple passes to not exceed maximum thicknesses recommended by manufacturer. Do not spray into rising foam.

END OF SECTION 072119

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SECTION 074213.19 - INSULATED CORE METAL WALL PANELS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Foamed-insulation-core horizontal metal wall panel assembly with integral reveals and profiled panels, with related metal trim and accessories, and the following integrated components:
 - 1. Integrated window system.
 - 2. Integrated wall louver units.

1.2 RELATED REQUIREMENTS

- A. Division 07 Section "Air Barriers" for transition and flashing components of air/moisture barrier.
- B. Division 07 Section "Sheet Metal Flashing and Trim" for sheet metal copings, flashings, reglets and roof drainage items.
- C. Division 07 Section "Joint Sealants" for field-applied joint sealants.

1.3 REFERENCES

- A. American Architectural Manufacturers Association (AAMA):
 - 1. AAMA 501.1 - Standard Test Method for Water Penetration of Windows, Curtain Walls and Doors Using Dynamic Pressure.
 - 2. AAMA 501.2 - Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtainwalls and Sloped Glazing Systems.
 - 3. AAMA 621 - Voluntary Specification for High Performance Organic coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) and Zinc-Aluminum Coated Steel Substrates.
 - 4. AAMA 508-07 - Voluntary Test Method and Specifications for Pressure Equalized Rain Screen Wall Cladding Systems.
 - 5. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance.
 - 6. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.
- B. Air Movement and control Association International, Inc. (AMCA):
 - 1. AMCA 500-L – Test Methods for Louvers, Dampers.
- C. American Society of Civil Engineers (ASCE):
 - 1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.

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D. ASTM International (ASTM):

1. ASTM A 653/A 653M - Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
2. ASTM A 666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
3. ASTM A 755 - Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products.
4. ASTM B 117 - Standard Practice for Operating Salt Spray (Fog) Apparatus.
5. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
6. ASTM C 209 - Standard Test Methods for Cellulosic Fiber Insulating Board.
7. ASTM C 754 - Specification for Installation of Steel Framing Members to Receive Screw Attached Gypsum Panel Products.
8. ASTM C 1363 - Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus.
9. ASTM D 635 - Standard Test Method For Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.
10. ASTM D 968 - Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive.
11. ASTM D 1929 - Standard Test Method for Determining Ignition Temperature of Plastics.
12. ASTM D 2244 - Test Method for Calculation or Color Differences from Instrumentally Measured Color Coordinates.
13. ASTM D 3359 - Standard Test Methods for Measuring Adhesion by Tape Tests.
14. ASTM D 4585 - Standard Practice for Testing Water Resistance of Coatings Using Controlled Condensation.
15. ASTM D 4587 - Standard Practice for Fluorescent UV-Condensation Exposures of Paint and Related Coatings.
16. ASTM E 72 - Standard Test Methods of Conducting Strength Tests of Panels for Building Construction.
17. ASTM E 84 - Test Methods for Surface Burning Characteristics of Building Materials.
18. ASTM E 119 - Test Methods for Fire Tests of Building Construction and Materials.
19. ASTM E 283 - Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors under Specified Pressure Differences across the Specimen.
20. ASTM E 329 - Standard Specification for Agencies Engaged in Construction Inspection and/or Testing.
21. ASTM E 331 - Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
22. ASTM E 1886 – Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials.
23. ASTM E 1996 - Specification for Performance of Exterior Windows, Curtain Walls, Doors and Impact Protective Systems Impacted by Windborne Debris in Hurricanes.
24. ASTM G 154 - Standard Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials.

E. Factory Mutual Global (FMG):

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1. ANSI/FMG 4880 Standard for Evaluating Insulated Wall & Roof/Ceiling Assemblies.
2. ANSI/FMG 4881 Standard for Evaluating Class 1 Exterior Wall Assemblies.

F. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA):

1. Architectural Sheet Metal Manual.

G. Underwriters Laboratories, Inc. (UL):

1. UL 263 - Fire Tests of Building Construction and Materials.
2. UL 723 - Test for Surface Burning Characteristics of Building Materials.
3. UL 972 - Standard of Safety for Burglary Resisting Glazing Material

1.4 PERFORMANCE REQUIREMENTS

- A. General: Provide metal wall panel system meeting performance requirements as determined by application of specified tests by a qualified testing agency on manufacturer's standard assemblies.
- B. Air Infiltration: Maximum 0.06 cfm/sq. ft. (0.3 L/s per sq. m) per ASTM E 283 at a static-air-pressure difference of 6.24 lb./sq. ft. (300 Pa), using minimum 10-by-10 foot (3050-by-3050 mm) test panel that includes horizontal and vertical joints.
- C. Water Penetration, Static Pressure: No uncontrolled water penetration per ASTM E 331 at a minimum static differential pressure of 15 lb. /sq. ft. (718 Pa), using minimum 10-by-10 foot (3050-by-3050 mm) test panel that includes horizontal and vertical joints.
- D. Water Penetration, Static Pressure – 2 hour duration: Panel system shall demonstrate no water penetration when tested in accordance with ASTM E331 at 6.24 psf pressure differential for a two (2) hour duration to satisfy International Building Code, Section 1403.2. Panel systems unable to demonstrate compliance with this requirement will require a separate weather-resistive barrier installed behind the wall panel system to comply with International Building Code requirements.
- E. Water Penetration, Dynamic Pressure: No uncontrolled water penetration per AAMA 501.1 at a minimum static differential pressure of 15 lb. /sq. ft. (718 Pa), using minimum 10-by-10 foot (3050-by-3050 mm) test panel that includes horizontal and vertical joints.
- F. System Performance: A 3rd party test report utilizing the standard ASTM E 283, E 331 and AAMA 501 procedures following the test protocol described in AAMA 508-07 must be submitted prior to bid. Test panel must include a horizontal joint, with an imperfect air barrier.
1. Bidders supplying panel systems that have not successfully passed AAMA 508-07 shall provide a backup system that meets the air and water infiltration values as listed above in sections 1.5.B – 1.5.E.
- G. Water Absorption: Maximum 1.0 percent absorption rate by volume when tested according to ASTM C 209.

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- H. Structural Performance: Provide metal wall panel assemblies capable of withstanding the effects of indicated loads and stresses within limits and under conditions indicated, per ASTM E 72:
 - 1. Wind Loads: Determine loads based on uniform pressure, importance factor, exposure category, and basic wind speed indicated on drawings.
 - 2. Limits of Deflection: Composite wall panel system shall withstand scheduled wind pressure with the following allowable deflection:
 - a. Maximum allowable deflection limited to L/180 deflection of panel perimeter normal to plane of wall with no evidence of failure.
 - 3. Seismic Performance: Comply with ASCE 7 Sections 11 - 23, "Seismic".
- I. Thermal Movements: Allow for thermal movements from variations in both ambient and internal temperatures. Accommodate movement of support structure caused by thermal expansion and contraction.
- J. Thermal Performance: Thermal-resistance (R) value indicated, per ASTM C 1363, with the following conditions:
 - 1. 15 mph exterior wind speed and still air on interior.
 - 2. Include side joint and standard fastening.
 - 3. Base R value reported on performance of specified panel, taking into account integral reveals and profiling with resultant reduction in panel insulation thickness.
- K. Fire Performance Characteristics: Provide metal composite wall systems that comply with the performance requirements of Chapter 26 Plastic of the 2012 International Building Code.
 - 1. Fire Performance of Insulated Wall: Class 1 wall panel per ANSI/FM 4880 & 4881.

1.5 QUALITY ASSURANCE

- A. Manufacturer/Source: Provide metal wall panel system and panel accessories from a single manufacturer.
- B. Manufacturer Qualifications: Approved manufacturer listed in this Section with minimum 10 years experience in manufacture of similar products in successful use in similar applications.
 - 1. Approval of Comparable Products: Submit the following in accordance with project substitution requirements, within time allowed for substitution review:
 - a. Product data, including certified independent test data indicating compliance with requirements. Include detailed data indicating compliance with AAMA 508-07 performance specified in this section.
 - b. Samples of each component.
 - c. Sample submittal from similar project.
 - d. Project references: Minimum of 5 installations not less than 5 years old, with Owner and Architect contact information.

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- e. Sample warranty.
- 2. Substitutions following award of contract are not allowed except as stipulated in Division 01 General Requirements.
- 3. Approved manufacturers must meet separate requirements of Submittals Article.
- C. Wall Systems Installer Qualifications: Experienced Installer with minimum of 5 years experience with successfully completed projects of a similar nature and scope, and employing workers trained by manufacturer to install products of this Section.
- D. Testing Agency Qualifications: Qualify in accordance with requirements of ASTM E 329.
- E. Mockups: Build mockup in size and location indicated. Show details of composite wall panel system. Demonstrate methods and details of installation. Show details of gasketed return vertical joints, penetrations, doors, windows, louvers, pipe openings, inside and outside corners, top and bottom of wall, horizontal and vertical joints.
 - 1. Approval of mockup does not relieve Contractor of responsibility to comply with all requirements of contract documents.
 - 2. Approved mockup may become part of installation if approved by Architect.

1.6 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Conduct preinstallation meeting at site attended by Owner, Architect, manufacturer's technical representative, and other trade contractors.
 - 1. Coordinate building framing in relation to composite wall panel system.
 - 2. Coordinate windows, doors and louvers, and other openings and penetrations of composite wall panel system.

1.7 ACTION SUBMITTALS

- A. Product Data: Manufacturer's data sheets for specified products.
- B. Shop Drawings: Provide shop drawings prepared by manufacturer or manufacturer's authorized dealer. Include full elevations showing openings and penetrations. Include details of each condition of installation and attachment. Provide details at a minimum scale 1-1/2-inch per foot of all required trim and extrusions needed for a complete installation
 - 1. Indicate points of supporting structure that must coordinate with composite wall panel system installation.
- C. Samples for Initial Selection: For each product specified including sealants and gaskets. Provide representative color charts of manufacturer's full range of colors.
- D. Samples for Verification: Provide 24-inch section of wall panel showing finishes, horizontal joinery, vertical joint return, injected core material, panel stiffener and anchoring details. Provide 12-inch long pieces of each extruded aluminum trim and gaskets.

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1.8 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Indicating compliance of products with requirements, from a qualified independent testing agency.
- B. Buy American Act Certification: Submit documentation certifying that products comply with provisions of the Buy American Act 41 U.S.C 10a – 10d.
- C. ASTM E 1886 & E 1996 Large Missile impact test.
- D. Manufacturer's warranty: Submit sample warranty.

1.9 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Protect products of composite wall panel system during shipping, handling, and storage to prevent staining, denting, deterioration of components or other damage.
 - 1. Deliver, unload, store, and erect composite wall panel system and accessory items without misshaping panels or exposing panels to surface damage from weather or construction operations.
 - 2. Store in accordance with manufacturers written instructions.

1.11 WARRANTY

- A. Special Manufacturer's Warranty: On manufacturer's standard form, in which manufacturer agrees to repair or replace metal wall panel assemblies and window units and louver units that fail in materials and workmanship within two years from date of Substantial Completion.
- B. Special Panel Finish Warranty: On manufacturer's standard form, in which manufacturer agrees to repair or replace wall panels that display evidence of deterioration of finish within 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Insulated Core Metal Wall Panel System: Factory-foamed-in-place vertical wall panel system consisting of exterior metal face sheet with interior metal liner panel, bonded to factory foamed-in-place core in thermally-separated profile, utilizing no glues or adhesives, with factory sealed tongue-and-groove and pressure-equalized rainscreen-designed horizontal and vertical joints, attached to supports using concealed fasteners.
 - 1. System is provided complete with window units, and louvers where indicated.

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2.2 MANUFACTURERS

- A. Basis of Design: **CENTRIA, Formawall Dimension Series Insulated Core Metal Wall Panels.** Provide basis of design product, or comparable product approved by Architect prior to bid.

1. CENTRIA Architectural Systems; Moon Township, PA 15108-2944. Tel: (800)759-7474. Tel: (412)299-8000. Fax: (412)299-8317. Email: info@CENTRIA.com. Web: www.CENTRIA.com.
2. Metl-Span
3. MBCI

2.3 PANEL MATERIALS -

- A. Stainless Steel Face Sheet (designated as MP-1):

1. Stainless Steel Sheet: 304 Stainless steel.
2. Face Sheet Thickness: Minimum 0.030 inch/22 gage thick.
3. Surface: Smooth, flat #4 Brushed.

- B. Exposed Coil-Coated Face Sheet (designated as MP-2):

1. Fluoropolymer Two-Coat System: 0.2 mil primer with 0.8 mil 70 percent PVDF fluoropolymer color coat, AAMA 621.

- a. Basis of Design: **CENTRIA Fluorofinish.**

2. Color: Up to three colors as selected by Architect from manufacturer's standard colors.

- C. Metallic-Coated Steel Liner Sheet: Coil-coated, ASTM A 755/A 755M, 0.019 inch/26 gage thick.

1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90, structural quality.
2. Surface: Smooth planked.
3. Interior Liner Panel Finish: 0.2 mil primer with 0.6 mil polyester color coat.

- D. Exposed Trim and Fasteners: Match panel finish.

2.4 INSULATION FOR PANEL CORES

- A. Metal Panel Foamed-Insulation-Core: Foamed-in-place isocyanurate.

1. Density: Minimum 2.7 lb/cu. ft.

2.5 FOAMED-INSULATION-CORE METAL WALL PANELS

- A. Foamed-Insulation-Core Metal Wall Panels: Factory-foamed-in-place horizontal and / or vertical wall panel system consisting of an exterior metal face sheet with interior metal liner panel forming a thermally separated profile, bonded to factory foamed-in-place core, and with

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factory-sealed tongue-and-groove and rainscreen-designed pressure-equalized horizontal side joint, configured with weep-hole-vented chamber to maintain equalized atmospheric pressure reducing potential for moisture drive into wall assembly, attached to supports using concealed fasteners.

1. Exclusions: The following do not meet the requirements of this Section:
 - a. Laminated panels.
 - b. Barrier wall-designed systems.
 - c. Systems relying upon venting only at vertical joints to attain pressure equalization.
 - d. Systems relying upon field-installed gaskets or wet seals to meet performance requirements.
2. Horizontal / Vertical Panel - Side Joint: Side joints with positive drip edge, sloped drain shelf and integral venting to the exterior along the panel length to permit moisture drainage and to allow air to enter the pressure equalization chamber. Side joints shall have a 2-3/8-inch baffle interlock and shall provide effective pressure equalization as demonstrated by testing specified in 1.4.F.
3. Horizontal / Vertical Panel - End Joint: End joints for insulated metal panels shall be designed to allow moisture to be drained from the panel's side joint. No end dam sealant is to be applied to the ends of the side joint at the end joint location.
 - a. Backer Flash - A continuous back-up flash behind the end joint is required with two beads of field applied non-curing butyl sealant between the panel and back up flashing for each panel. The field applied non-curing butyl sealant shall be married to the panel's shop applied non-curing butyl sealant within the panel's side joint.
 1. Insulated Metal Vertical Joint (IMV) - End joint shall include an integrated, Insulated Metal Vertical Joint. The Insulated Metal Vertical Joint shall be recessed 1-3/16" deep and be 5/8" wide. The Insulated Metal Vertical Joint should not add exterior sightlines, contain exposed metal edges or exposed wet seals. The Insulated Metal Vertical Joint shall be constructed of an EPDM Foam Block adhered to a metal face of the same material, gage and color as the face of the panel.
 - b. PE Seal Plate – An extruded aluminum seal plate with combination TPE gasket, drain cavity and non-curing butyl seal a vertical pressure-equalized vented chamber permitting moisture to drain to exterior. The field applied non-curing butyl sealant shall be married to the panel's shop applied non-curing butyl sealant within the panel's side joint.

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1. Insulated Metal Vertical Joint (IMV) - End joint shall include an integrated, Insulated Metal Vertical Joint. The Insulated Metal Vertical Joint shall be recessed 1-3/16" deep and be 5/8" wide. The Insulated Metal Vertical Joint should not add exterior sightlines, contain exposed metal edges or exposed wet seals. The Insulated Metal Vertical Joint shall be constructed of an EPDM Foam Block adhered to a metal face of the same material, gage and color as the face of the panel.
4. Panel Ends: Flat Panels - Factory formed trimless ends, tabbed under panel horizontal shelf. Profile Panels – Factory applied end caps of matching substrate, color and finish.
5. Panel Width: Standard widths indicated.
6. Panel Profile: Flat Profile in locations and sizes indicated.
7. Panel Reveals:
 - a. Vertical panels
 - 1) Flat Panels: 0.5" reveal
 - 2) Profile-faced Panels: As indicated.
 - 3) Steep Sloped Joint: 1-3/16 inch – for 3"-T, 45 degree (0.78 rad) sloped joint as indicated.
8. Panel Thickness: 2.0 inch flat.
9. Thermal-Resistance (R) Value: 2" flat - R-14.

2.6 METAL WALL PANEL ACCESSORIES

- A. General: Provide complete metal wall panel assembly incorporating trim, copings, fasciae, parapet caps, soffits, sills, inside and outside corners, and miscellaneous flashings. Provide manufacturer's factory-formed clips, shims, flashings, gaskets, lap tapes, closure strips, and caps for a complete installation. Fabricate accessories in accordance with SMACNA Manual.
- B. Formed Flashing and Trim: Match material, thickness, and color of metal wall panel face sheets.
- C. Extrusion Trim: Provide manufacturer-provided extruded trim for the following locations and as indicated on Drawings:
 1. Base trim.
 2. Coping.
 3. Panel installation perimeter.
 4. Opening perimeters.
- D. Sealants: Type recommended by metal wall panel system manufacturer for application, meeting requirements of Division 07 Section "Joint Sealants."
- E. Flashing Tape: 4-inch wide self-adhering butyl flashing tape.

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- F. Panel Attachment Clips: Concealed G-90 galvanized steel clip configured to prevent overdriving of fastener and crushing of foam core, with panel fasteners engaging both face and liner elements and mechanically attaching to panel supports. Clip configured also to be utilized without removing significant portions of the foam at each clip location.
- G. Fasteners: Self-tapping screws, bolts, nuts, and other acceptable fasteners recommended by panel manufacturer. Where exposed fasteners cannot be avoided, supply corrosion-resistant fasteners with heads matching color of metal wall panels by means factory-applied coating.

2.7 INTEGRATED WINDOW SYSTEM

- A. Integrated Window Units: Thermally-improved fixed aluminum window units designed to integrate with metal wall panel profile and secondary support system without receptor channels or other flashing. System to be tested integrated with panels per the requirements of section 1.5 B and 1.5 C. Sash to accept 1 inch insulating glass units.
 - 1. Basis of Design: **CENTRIA Formavue FV-400 Integrated Window System.**
 - a. System Depth: 7-5/8 inch, with steel through-tube supports.
 - b. Sightlines: Head: 2-1/2 inch; Sill: 2-1/2 inch; Mullions: 2-1/2 inch.
 - c. Exterior pressure bar glazing with snap-on cover.
 - d. Integral gutter at window head and panel base.
 - 2. Finish, Exterior:
 - a. Color Anodic Finish, Architectural Class I, AAMA 611.
 - 3. Finish, Interior:
 - a. Color Anodic Finish, Architectural Class I, AAMA 611.
 - 4. Glazing: 1 inch insulating glass, as specified in Division 08800 Section "Glazing."

2.8 INTEGRATED WALL LOUVER UNITS

- A. Manufacturers/Products:
 - 1. Product: **C/S Louvers by Construction Specialties, Inc.**, Specifier: Insert C/S model number for basis of design louver.
- B. Exterior Wall Louvers, General: Extruded aluminum louvers, designed to integrate with metal wall panel profile and secondary support system without receptor channels or other flashing, nominal thickness not less than 0.060 inch for blades and 0.080 inch for frames, of types and performance indicated. System to be tested integrated with panels per the requirements of section 1.5 B and 1.5 C.
 - 1. Louver Depth: 6 inches deep.
 - 2. Mullion Type: Exposed.
- C. Horizontal, Sightproof, Drainable-Blade Fixed Louver:

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1. Free Area: Not less than 50 percent.
2. Air Performance: Not exceeding 0.10-inch wg static pressure drop at 600-fpm free area velocity.
3. Wind-Driven Rain Performance: Minimum 99 percent effectiveness at rain fall rate of 3 inches per hour and a wind speed of 29 mph at intake velocity of 300 fpm.
4. Point of Beginning Water Penetration: Not less than 750 fpm.

D. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

E. Finish, Exterior:

1. Match metal wall panel finish.

2.9 SECONDARY METAL FRAMING

- A. Miscellaneous Framing Components, General: Cold-formed metallic-coated steel sheet, ASTM A 653/A 653M, G90 (Z180) hot-dip galvanized zinc coating.
- B. Subgirts: C- or Z- shaped sections, 0.054-inch minimum.
- C. Sill Channels: 0.054-inch minimum.
- D. Hat Channels: 0.054-inch minimum.
- E. Steel vertical tube structural supports for metal wall panel system, coordinated with panel system components, engineered to meet project structural design requirements, and finished to match panel interior finish, of size indicated on approved shop drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine metal wall panel system substrate with Installer present. Inspect for erection tolerances and other conditions that would adversely affect installation of metal wall panels.
- B. Wall Substrate: Confirm that wall substrate is within tolerances acceptable to metal wall panel system manufacturer.
 1. Maximum deviations acceptable:
 - a. 1/4-inch in 20 feet vertically or horizontally from face plane of framing.
 - b. 1/2-inch from flat substrate on any building elevation.
 - c. 1/8-inch in 5 feet.
- C. Framing: Inspect framing that will support metal wall panels to determine if support components are installed as indicated on approved shop drawings. Confirm presence of acceptable framing members at recommended spacing to match installation requirements of metal wall panels.

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- D. Openings: Verify that windows, doors, louvers and other penetrations match layout on shop drawings.
- E. Advise G.C., in writing, of all out- of-tolerance work and other deficient conditions prior to proceeding with metal wall panel installation.
- F. Correct out of tolerance work and other deficient conditions prior to proceeding with insulated panel installation.

3.2 PREPARATION

- A. Secondary Metal Framing: Install secondary metal framing components as indicated. Install secondary metal framing and other metal panel supports per ASTM C 754 and metal wall panel manufacturer's recommendations.

3.3 METAL WALL PANEL SYSTEM INSTALLATION

- A. General: Install metal wall panel system in accordance with approved shop drawings and manufacturer's recommendations. Install metal wall panels in orientation, sizes, and locations indicated. Anchor metal wall panels and other components securely in place. Provide for thermal and structural movement
- B. Attach panels to metal framing using recommended clips, screws, fasteners, sealants, and adhesives indicated on approved shop drawings.
 - 1. Fasteners for Steel Wall Panels: Stainless-steel for exterior locations and locations exposed to moisture; carbon steel for interior use only.
 - 2. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as indicated or, if not indicated, as approved by manufacturer.
 - 3. Fasten metal wall panels to supports with concealed clips at each joint at location, spacing, and with fasteners recommended by manufacturer. Install clips to supports with self-tapping fasteners.
 - 4. Provide weatherproof escutcheons for pipe and conduit penetrating exterior walls.
 - 5. Horizontal Joinery: Working from base of installation to top connect upper panel to lower panel at dry seal joinery.
 - 6. Vertical Joinery: Provide reveal between vertical ends of panels as shown on shop drawings using hardware and gaskets furnished by manufacturer to form a weather tight seal between panels.
 - 7. Dissimilar Materials: Where elements of metal wall panel system will come into contact with dissimilar materials, treat faces and edges in contact with dissimilar materials as recommended by manufacturer.
- C. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal wall panel assemblies.
 - 1. Seal panel end utilizing 2 beads of non-curing butyl aligning with factory-applied seal in adjacent panel pocket; apply continuously without gaps to complete panel system air barrier.

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2. Seal metal wall panel to supports or back-up flashing sealant, full width of panel. Seal side joints where recommended by metal wall panel manufacturer. Do not install sealant in locations that will interfere with drainage of pressure-equalized panel chambers.
3. Prepare joints and apply sealants per Division 07 Section "Joint Sealants."

3.4 ACCESSORY INSTALLATION

- A. General: Install metal wall panel accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
 1. Install related flashings and sheet metal trim per requirements of Division 07 Section "Sheet Metal Flashing and Trim."
 2. Install components required for a complete metal wall panel assembly, including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
 3. Comply with performance requirements and manufacturer's written installation instructions.
 4. Provide concealed fasteners except where noted on approved shop drawings.
 5. Set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

3.5 INTEGRATED UNIT INSTALLATION

- A. Install window units and louvers in accordance with manufacturer's recommendations and approved shop drawings. Anchor supports to structure with approved anchors. Assemble wall components using gaskets, fasteners, and trim supplied by metal wall panel manufacturer. Separate dissimilar metals with manufacturer's approved coating.

3.6 FIELD QUALITY CONTROL

- A. The panel installer shall water test panel and window areas for each crew at least twice during installation schedule and once at the conclusion of the installation.
- B. Progress or check tests can be performed by the installer following test procedures noted in AAMA 501.2. No independent test agency need to be employed in this test phase. Results of this test phase is to be recorded and reported to the panel manufacturer.
- C. Final AAMA 501.2 testing will be conducted by an independent test agency following project completion. Areas of test are to be determined by the Architect/Engineer and General Contractor/Contract Manager and the panel installer. Engagement of the test agency is the responsibility of the panel installer. A field representative from the panel manufacturer is required for the final inspection and testing.

3.7 CLEANING AND PROTECTION

- A. Remove temporary protective films. Clean finished surfaces as recommended by metal wall panel manufacturer. Clear weep holes and drainage channels of obstructions, dirt, and sealant. Maintain in a clean condition during construction.

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- B. Replace damaged panels and accessories that cannot be repaired by finish touch-up or minor repair.

END OF SECTION

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SECTION 072419 - WATER-DRAINAGE EXTERIOR INSULATION AND FINISH SYSTEM (EIFS)

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. EIFS-clad drainage-wall assemblies that are field applied over substrate.
2. Water-resistive coatings.

1.2 ACTION SUBMITTALS

- ##### A. Product Data:
- For each EIFS component, trim, and accessory, including water-resistive coatings.

1.3 INFORMATIONAL SUBMITTALS

- A. Manufacturer certificates.
- B. Product certificates.
- C. Product test reports.
- D. Field quality-control reports and special inspection reports.
- E. Evaluation reports.

1.4 CLOSEOUT SUBMITTALS

- ##### A. Maintenance data.

1.5 QUALITY ASSURANCE

- ##### A. Installer Qualifications:
- An installer who is certified in writing by EIFS manufacturer as qualified to install manufacturer's system using trained workers.

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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. Dryvit Systems, Inc.
 - 2. Parex USA, Inc.
 - 3. Sto Corp.
- B. Source Limitations: Obtain EIFS from single source from single EIFS manufacturer and from sources approved by EIFS manufacturer as compatible with EIFS components.

2.2 PERFORMANCE REQUIREMENTS

- A. EIFS Performance: Comply with ASTM E 2568 and ICC-ES AC219 and with the following:
 - 1. Weathertightness: Resistant to uncontrolled water penetration from exterior, with a means to drain water entering EIFS to the exterior.
 - 2. Impact Performance: ASTM E 2568, Standard impact resistance, unless otherwise indicated.
 - 3. Bond Integrity: Free from bond failure within EIFS components or between EIFS and substrates, resulting from exposure to fire, wind loads, weather, or other in-service conditions.

2.3 EIFS MATERIALS

- A. Primer/Sealer: EIFS manufacturer's standard substrate conditioner designed to protect substrates from moisture penetration and to improve the bond between substrate and insulation adhesive.
- B. Water-Resistive Coatings: EIFS manufacturer's standard formulation and accessories for use as water-resistive barriers; compatible with substrate and complying with physical and performance criteria of ASTM E 2570.
- C. Flexible-Membrane Flashing: Cold-applied, self-adhering, self-healing, rubberized-asphalt and polyethylene-film composite sheet or tape and primer; EIFS manufacturer's standard or product recommended in writing by EIFS manufacturer.
- D. Insulation Adhesive: EIFS manufacturer's standard formulation designed for indicated use; specifically formulated to be applied to back side of insulation in a manner that creates open vertical channels designed to serve as an integral part of the water-drainage system of the EIFS-clad drainage-wall assembly, compatible with substrate.
- E. Molded, Rigid Cellular Polystyrene Board Insulation: Comply with ASTM C 578, Type I.

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1. Foam Build-Outs: Provide with profiles and dimensions indicated on Drawings.
- F. Reinforcing Mesh: Balanced, alkali-resistant, open-weave, glass-fiber mesh treated for compatibility with other EIFS materials, made from continuous multiend strands with retained mesh tensile strength of not less than 120 lbf/in. according to ASTM E 2098.
- G. Base-Coat Materials: EIFS manufacturer's standard mixture.
- H. Waterproof Adhesive/Base-Coat Materials: EIFS manufacturer's standard waterproof formulation.
- I. Primer: EIFS manufacturer's standard factory-mixed, elastomeric-polymer primer for preparing base-coat surface for application of finish coat.
- J. Finish-Coat Materials: EIFS manufacturer's standard acrylic-based coating with enhanced mildew resistance.
 1. Colors: As selected by Architect from manufacturer's full range.
 2. Textures: As selected by Architect from manufacturer's full range.
- K. Trim Accessories: Type as designated or required to suit conditions indicated and to comply with EIFS manufacturer's written instructions; manufactured from UV-stabilized PVC; and complying with ASTM D 1784, manufacturer's standard cell class for use intended, and ASTM C 1063.

PART 3 - EXECUTION

3.1 EIFS INSTALLATION

- A. Comply with ASTM C 1397, ASTM E 2511, and EIFS manufacturer's written instructions for installation of EIFS as applicable to each type of substrate indicated.
- B. Trim: Apply trim accessories at perimeter of EIFS, at expansion joints, at windowsills, and elsewhere as indicated. Coordinate with installation of insulation.
- C. Board Insulation: Adhere insulation to substrate in compliance with ASTM C 1397 and the following:
 1. Apply adhesive to insulation by notched-trowel method, with notches oriented vertically to produce drainage channels that remain functional after the insulation is adhered to substrate.
 2. Coordinate installation of flashing and insulation to produce wall assembly that does not allow water to penetrate behind flashing and water-resistive barrier.
- D. Expansion Joints: Install at locations indicated and where required by EIFS manufacturer.

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- E. Waterproof Adhesive/Base Coat: To exposed surfaces of insulation, apply in minimum thickness recommended in writing by EIFS manufacturer over sloped surfaces, windowsills, parapets, and foam build-outs.
- F. Base Coat: Apply to exposed surfaces of insulation and foam build-outs in minimum thickness recommended in writing by EIFS manufacturer.
- G. Reinforcing Mesh: Embed reinforcing mesh in wet base coat to produce wrinkle-free installation with mesh continuous at corners, overlapped not less than 2-1/2 inches or otherwise treated at joints to comply with ASTM C 1397 and EIFS manufacturer's written instructions. Do not lap reinforcing mesh within 8 inches of corners. Completely embed mesh, applying additional base-coat material if necessary, so reinforcing-mesh color and pattern are invisible.
- H. Double-Layer Reinforcing-Mesh Application: Where indicated or required, apply second base coat and second layer of reinforcing mesh, overlapped not less than 2-1/2 inches or otherwise treated at joints to comply with ASTM C 1397 and EIFS manufacturer's written instructions in same manner as first application. Do not apply until first base coat has cured.
- I. Additional Reinforcing Mesh: Apply strip reinforcing mesh around openings, extending 4 inches beyond perimeter. Apply additional 9-by-12-inch strip reinforcing mesh diagonally at corners of openings (re-entrant corners). Apply 8-inch-wide, strip reinforcing mesh at both inside and outside corners unless base layer of mesh is lapped not less than 4 inches on each side of corners.
- J. Foam Build-Outs: Fully embed reinforcing mesh in base coat.
- K. Double Base-Coat Application: Where indicated, apply second base coat in same manner and thickness as first application, except without reinforcing mesh. Do not apply until first base coat has cured.
- L. Primer: Apply over dry base coat according to EIFS manufacturer's written instructions.
- M. Finish Coat: Apply over dry primed base coat, maintaining a wet edge at all times for uniform appearance, in thickness required by EIFS manufacturer to produce a uniform finish of color and texture matching approved sample and free of cold joints, shadow lines, and texture variations.

END OF SECTION 072419

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SECTION 072715 - NONBITUMINOUS SELF-ADHERING SHEET AIR BARRIERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Self-adhering, vapor-retarding, nonbituminous sheet air barriers.
2. Self-adhering, vapor-permeable, nonbituminous sheet air barriers.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of nonbituminous self-adhering sheet air barrier.
- B. Product test reports.
- C. Field quality-control reports.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Mockups: Build mockups to set quality standards for materials and execution.
 1. Build integrated mockups of exterior wall assembly, 48 sq. ft., incorporating backup wall construction, external cladding, window, storefront, door frame and sill, insulation, ties and other penetrations, and flashing to demonstrate surface preparation, crack and joint treatment, application of air barriers, and sealing of gaps, terminations, and penetrations of air-barrier assembly.
 - a. Coordinate construction of mockups to permit inspection and testing of air barrier before external insulation and cladding are installed.
 - b. Include junction with roofing membrane, building corner condition, and foundation wall intersection.

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PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Air-Barrier Performance: Air-barrier assembly and seals with adjacent construction shall be capable of performing as a continuous air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.
- B. Air-Barrier Assembly Air Leakage: Maximum 0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft., when tested according to ASTM E 2357.

2.2 NONBITUMINOUS SHEET AIR BARRIER

- A. Vapor-Retarding Nonbituminous Sheet: Minimum 10-mil- thick, self-adhering sheet consisting of 5 mils of air-barrier film and a 5-mil- thick, acrylic adhesive with release liner on adhesive side.
 - 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. 3M Industrial Adhesives and Tapes Division.
 - b. Carlisle Coatings & Waterproofing Inc.
 - 2. Physical and Performance Properties:
 - a. Air Permeance: Maximum 0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. pressure difference; ASTM E 2178.
 - b. Puncture Resistance: Minimum 40 lbf; ASTM E 154/E 154M.
 - c. Vapor Permeance: Maximum 1.0 perm; ASTM E 96/E 96M, Desiccant Method.
 - d. Adhesion to Substrate: Minimum 16 lbf/sq. in. when tested according to ASTM D 4541 as modified by ABAA.
 - e. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
 - f. UV Resistance: Can be exposed to sunlight for 150 days according to manufacturer's written instructions.
- B. Vapor-Permeable Nonbituminous Sheet: Minimum 20-mil- thick, self-adhering sheet consisting of a breathable carrier film or fabric and an adhesive with release liner on adhesive side.

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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. Carlisle Coatings & Waterproofing Inc.
2. Physical and Performance Properties:
 - a. Air Permeance: Maximum 0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. pressure difference; ASTM E 2178.
 - b. Puncture Resistance: Minimum 40 lbf; ASTM E 154/E 154M.
 - c. Vapor Permeance: Minimum 15 perms; ASTM E 96/E 96M, Desiccant Method, Procedure A.
 - d. Adhesion to Substrate: Minimum 16 lbf/sq. in. when tested according to ASTM D 4541 as modified by ABAA.
 - e. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
 - f. UV Resistance: Can be exposed to sunlight for 150 days according to manufacturer's written instructions.

2.3 ACCESSORY MATERIALS

- A. Requirement: Provide primers, transition strips, termination strips, joint sealants, counterflashing strips, flashing sheets and metal termination bars, termination mastic, substrate patching materials, adhesives, tapes, foam sealants, lap sealants, and other accessory materials that are recommended in writing by air-barrier manufacturer to produce a complete air-barrier assembly and that are compatible with primary air-barrier material and adjacent construction to which they may seal.
- B. Primer: Liquid solvent-borne primer recommended for substrate by air-barrier material manufacturer.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

- A. Clean, prepare, treat, fill, and seal substrate and joints and cracks in substrate according to manufacturer's written instructions and details. Provide clean, dust-free, and dry substrate for air-barrier application.
- B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.

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- C. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching membrane.
- D. Remove excess mortar from masonry ties, shelf angles, and other obstructions.
- E. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.
- F. Bridge isolation joints expansion joints and discontinuous wall-to-wall, deck-to-wall, and deck-to-deck joints with air-barrier accessory material that accommodates joint movement according to manufacturer's written instructions and details.

3.2 INSTALLATION

- A. Install materials according to air-barrier manufacturer's written instructions and details to form a seal with adjacent construction and ensure continuity of air and water barrier.
 - 1. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.
- B. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by air-barrier sheet on same day. Reprime areas exposed for more than 24 hours.
- C. Apply and firmly adhere air-barrier sheets over area to receive air barrier. Accurately align sheets and maintain uniform 2-1/2-inch- minimum lap widths and end laps. Overlap and seal seams, and stagger end laps to ensure airtight installation.
 - 1. Apply sheets in a shingled manner to shed water.
 - 2. Roll sheets firmly to enhance adhesion to substrate.
- D. Install air-barrier sheet and accessory materials to form a seal with adjacent construction and to maintain a continuous air barrier.
- E. Connect and seal exterior wall air-barrier sheet continuously to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.
- F. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply transition strip so that a minimum of 3 inches of coverage is achieved over each substrate. Maintain 3 inches of contact over firm bearing to perimeter frames, with not less than 1 inch of full contact.
- G. Repair punctures, voids, and deficient lapped seams in air barrier. Slit and flatten fishmouths and blisters. Patch with air-barrier sheet extending 6 inches beyond repaired areas in all directions.

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- H. Do not cover air barrier until it has been tested and inspected by testing agency.
- I. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

3.3 CLEANING AND PROTECTION

- A. Protect air-barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.

END OF SECTION 072715

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SECTION 074113.16 - STANDING-SEAM METAL ROOF PANELS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes standing-seam metal roof panels.

1.2 PREINSTALLATION MEETINGS

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

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
- C. Samples: For each type of metal panel indicated.

1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Warranties: Sample of special warranties.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. UL-Certified, Portable Roll-Forming Equipment: UL-certified, portable roll-forming equipment capable of producing metal panels warranted by manufacturer to be the same as factory-formed products. Maintain UL certification of portable roll-forming equipment for duration of work.

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1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Finish Warranty Period: 20 years from date of Substantial Completion.
- C. Special Weathertightness Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.
 - 1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Energy Performance: Provide roof panels that are listed on the EPA/DOE's ENERGY STAR "Roof Product List" for low-slope roof products.
- B. Energy Performance: Provide roof panels according to one of the following when tested according to CRRC-1:
 - 1. Three-year, aged solar reflectance of not less than 0.55 and emissivity of not less than 0.75.
 - 2. Three-year, aged Solar Reflectance Index of not less than 64 when calculated according to ASTM E 1980.
- C. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 1592:
 - 1. Wind Loads: Components and cladding for 100 mph winds.
- D. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. (0.3 L/s per sq. m) when tested according to ASTM E 1680 or ASTM E 283 at the following test-pressure difference:
 - 1. Test-Pressure Difference: 6.24 lbf/sq. ft. (300 Pa).
- E. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 1646 or ASTM E 331 at the following test-pressure difference:

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1. Test-Pressure Difference: 6.24 lbf/sq. ft. (300 Pa).
- F. Hydrostatic-Head Resistance: No water penetration when tested according to ASTM E 2140.
- G. FM Global Listing: Provide metal roof panels and component materials that comply with requirements in FM Global 4471 as part of a panel roofing system and that are listed in FM Global's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Global markings.
 1. Fire/Windstorm Classification: Class 1A.
 2. Hail Resistance: SH.
- H. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 STANDING-SEAM METAL ROOF PANELS

- A. General: Provide factory-formed metal roof panels designed to be installed by interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.
- B. Vertical-Rib, Seamed-Joint, Standing-Seam Metal Roof Panels: Formed with vertical ribs at panel edges and a flat pan between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels, engaging opposite edge of adjacent panels, and mechanically seaming panels together.
 1. Same manufacturer to provide standing-seam metal roof panels as insulated metal wall panels. Basis of Design: SRS-3 Planked by Centria.
 2. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A 653/A 653M, G90 (Z275) coating designation. Prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
 - a. Nominal Thickness: 0.024 inch (0.56 mm).
 - b. Exterior Finish: See paragraph 2.6.
 - c. Color: As selected by Architect from manufacturer's full range.
 3. Clips: Two-piece floating to accommodate thermal movement except at point of fixity. Provide one-piece fixed clips at points of fixity.
 - a. Material: 0.036-inch- (0.64-mm-) thick, stainless-steel sheet.
 4. Joint Type: Double folded.
 5. Panel Coverage: 12 inches.
 6. Panel Height: 3.0 inches.

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2.3 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Underlayment: Provide self-adhering, cold-applied, sheet underlayment, a minimum of 30 mils (0.76 mm) thick, consisting of slip-resistant, polyethylene-film top surface laminated to a layer of butyl or SBS-modified asphalt adhesive, with release-paper backing. Provide primer when recommended by underlayment manufacturer.
 - 1. Thermal Stability: Stable after testing at 240 deg F (116 deg C); ASTM D 1970.
 - 2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F (29 deg C); ASTM D 1970.
 - 3. As recommended by metal roof panel manufacturer.
- B. Slip Sheet: Manufacturer's recommended slip sheet, of type required for application.

2.4 INSULATION

- A. See Section 075419 for substrate, insulation, and cover board.

2.5 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C 645; cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 (Z275 hot-dip galvanized) coating designation or ASTM A 792/A 792M, Class AZ50 (Class AZM150) coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
 - 1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal panels.
 - 2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
 - 3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels 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. Finish flashing and trim with same finish system as adjacent metal panels.
- D. Gutters and Downspouts: Formed from same material as roof panels according to SMACNA's "Architectural Sheet Metal Manual." Finish to match roof fascia and rake trim.

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- E. Roof Curbs: Fabricated from same material as roof panels, 0.048-inch (1.2-mm) nominal thickness; with bottom of skirt profiled to match roof panel profiles and with welded top box and integral full-length cricket. Fabricate curb subframing of 0.060-inch- (1.52-mm-) nominal thickness, angle-, C-, or Z-shaped steel sheet. Fabricate curb and subframing to withstand indicated loads of size and height indicated. Finish roof curbs to match metal roof panels.
- F. Panel Fasteners: Self-tapping screws designed to withstand design loads.
- G. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
 - 1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing; 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
 - 2. Joint Sealant: ASTM C 920; as recommended in writing by metal panel manufacturer.
 - 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

2.6 FABRICATION

- A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate according to equipment manufacturer's written instructions and to comply with details shown.
- C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- D. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.
- E. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

2.7 FINISHES

- A. Panels and Accessories:
 - 1. Basis of design: Versacor Elite AM by Centria.
 - a. 0.5 mil nominal clear coat
 - b. 0.8 mil nominal PVDF metallic effect color coat.

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- c. 2.0 mil nominal elite barrier coat.
2. Concealed Finish: White or light-colored acrylic or polyester backer finish.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.

3.2 UNDERLAYMENT INSTALLATION

- A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply at locations indicated below, wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches (152 mm) staggered 24 inches (610 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Extend underlayment down exterior face of wood nailers. Roll laps with roller. Cover underlayment within 14 days.
 1. Apply over the entire roof surface.
- B. Slip Sheet: Apply slip sheet over underlayment before installing metal roof panels.
- C. Flashings: Install flashings to cover underlayment to comply with requirements specified in Section 076200 "Sheet Metal Flashing and Trim."

3.3 METAL PANEL INSTALLATION

- A. Standing-Seam Metal Roof Panel Installation: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended in writing by manufacturer.
 1. Install clips to supports with self-tapping fasteners.
 2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
 3. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.
 4. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.
 5. Watertight Installation:
 - a. Apply a continuous ribbon of sealant or tape to seal joints of metal panels, using sealant or tape as recommend in writing by manufacturer as needed to make panels watertight.

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- b. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
 - c. At panel splices, nest panels with minimum 6-inch (152-mm) end lap, sealed with sealant and fastened together by interlocking clamping plates.
- B. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
- C. 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 set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

3.4 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

END OF SECTION 074113.16

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SECTION 075419 - POLYVINYL-CHLORIDE (PVC) ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Adhered polyvinyl-chloride (PVC) roofing system.
2. Roof insulation at all Roof Areas.

1.2 DEFINITIONS

- ##### **A. Roofing Terminology:** Definitions in ASTM D 1079 and glossary in NRCA's "The NRCA Roofing and Waterproofing Manual" apply to work of this Section.

1.3 PREINSTALLATION MEETINGS

- ##### **A. Preinstallation Roofing Conference:** Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- ##### **A. Product Data:** For each type of product.
- ##### **B. Shop Drawings:** For roofing system. Include plans, elevations, sections, details, and attachments to other work.
- ##### **C. Samples for Verification:** For the following products:
1. Sheet roofing, of color required.
 2. Walkway pads or rolls, of color required.

1.5 INFORMATIONAL SUBMITTALS

- ##### **A. Research/Evaluation Reports:** For components of roofing system, from ICC-ES.
- ##### **B. Sample Warranties:** For manufacturer's special warranties.

1.6 CLOSEOUT SUBMITTALS

- ##### **A. Maintenance Data:** For roofing system to include in maintenance manuals.

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1.7 QUALITY ASSURANCE

- A. **Installer Qualifications:** A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

1.8 WARRANTY

- A. **Special Warranty:** Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.
 - 1. **Warranty Period:** 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. **Source Limitations:** Obtain components including roof insulation fasteners for roofing system from same manufacturer as membrane roofing or manufacturer approved by membrane roofing manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. **Accelerated Weathering:** Roofing system shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.
- B. **Impact Resistance:** Roofing system shall resist impact damage when tested according to ASTM D 3746 or ASTM D 4272.
- C. **Roofing System Design:** Tested by a qualified testing agency to resist the following uplift pressures:
 - 1. **Corner Uplift Pressure:** 225 psf.
 - 2. **Perimeter Uplift Pressure:** 150 psf.
 - 3. **Field-of-Roof Uplift Pressure:** 90 psf.
- D. **Energy Star Listing:** Roofing system shall be listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for low-slope roof products.
- E. **Energy Performance:** Roofing system shall have an initial solar reflectance of not less than 0.70 and an emissivity of not less than 0.75 when tested according to CRRC-1.
- F. **Exterior Fire-Test Exposure:** ASTM E 108 or UL 790, Class A; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

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- G. Fire-Resistance Ratings: Comply with fire-resistance-rated assembly designs indicated. Identify products with appropriate markings of applicable testing agency.

2.3 MEMBRANE ROOFING

A. PVC Sheet: ASTM D 4434.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Carlisle SynTec Incorporated.
 - b. Sika Sarnafil
 - c. Versico Versiflex PVC
2. Thickness: 72 mils minimum.
3. Exposed Face Color: White.

B. KEE Sheet: ASTM D 6754.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. FiberTite.
2. Thickness: 60 mils (1.5 mm), nominal.
3. Exposed Face Color: White.

2.4 AUXILIARY ROOFING MATERIALS

A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing.

1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.

B. Sheet Flashing: Manufacturer's standard sheet flashing of same material, type, reinforcement, and color as PVC sheet. Thickness: 60 mil minimum.

C. Bonding Adhesive: Manufacturer's standard.

D. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening roofing to substrate, and acceptable to roofing system manufacturer.

E. Miscellaneous Accessories: Provide metal termination bars, metal battens, pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

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2.5 SUBSTRATE BOARDS at roof areas with architectural or architectural acoustic roof deck only.

- A. Substrate Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, Type X, 5/8 inch (16 mm) thick.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following, for inclusion in the membrane manufacturer's warranty:
 - a. Georgia-Pacific Building Products.
 - b. National Gypsum Company.
 - c. United States Gypsum Company.
- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening substrate board to roof deck.

2.6 ROOF INSULATION

- A. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 2, glass-fiber mat facer on both major surfaces.
 - 1. Per membrane manufacturer, for inclusion in warranty.
- B. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of 1/4 inch per 12 inches (1:48) unless otherwise indicated.
- C. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

2.7 INSULATION ACCESSORIES

- A. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening roof insulation to substrate, and acceptable to roofing system manufacturer.
- B. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer.
- C. Cover Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, 1/2 inch (13 mm) thick, factory primed.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following, for inclusion in the membrane manufacturer's warranty:
 - a. Georgia-Pacific Building Products.
 - b. National Gypsum Company.
 - c. United States Gypsum Company.

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2.8 WALKWAYS

- A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads or rolls, approximately 3/16 inch (5 mm) thick and acceptable to roofing system manufacturer.

PART 3 - EXECUTION

3.1 ROOFING INSTALLATION, GENERAL

- A. Install roofing system according to roofing system manufacturer's written instructions.
- B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at end of workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.
- C. Install roofing and auxiliary materials to tie in to existing roofing to maintain weathertightness of transition.

3.2 SUBSTRATE BOARD INSTALLATION

- A. Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.
 - 1. Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to roofing system manufacturers' written instructions.

3.3 INSULATION INSTALLATION

- A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
- B. Install tapered insulation under area of roofing to conform to slopes indicated.
- C. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2.7 inches or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches (150 mm) in each direction.
- D. Adhered Insulation: Install each layer of insulation and adhere to substrate as follows (typical, unless noted otherwise):
 - 1. Prime surface of concrete deck with asphalt primer at rate of 3/4 gal./100 sq. ft. (0.3 L/sq. m), and allow primer to dry.

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2. Set each layer of insulation in insulation adhesive, firmly pressing and maintaining insulation in place.
- E. Mechanically Fastened and Adhered Insulation: Install substrate or layer of insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type. See drawing sheet R2.0.
 1. Fasten substrate or first layer of insulation to resist uplift pressure at corners, perimeter, and field of roof.
 2. Set each subsequent layer of insulation in insulation adhesive, firmly pressing and maintaining insulation in place.
- F. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches (150 mm) in each direction. Loosely butt cover boards together.
 1. Adhere cover boards to resist uplift pressure at corners, perimeter, and field of roof.

3.4 ADHERED ROOFING INSTALLATION

- A. Adhere roofing over area to receive roofing according to roofing system manufacturer's written instructions. Unroll roofing and allow to relax before retaining.
 1. Install sheet according to ASTM D 5036.
- B. Accurately align roofing, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- C. Bonding Adhesive: Apply to substrate and underside of roofing at rate required by manufacturer, and allow to partially dry before installing roofing. Do not apply to splice area of roofing.
- D. In addition to adhering, mechanically fasten roofing securely at terminations, penetrations, and perimeter of roofing.
- E. Seams: Clean seam areas, overlap roofing, and hot-air weld side and end laps of roofing and sheet flashings according to manufacturer's written instructions, to ensure a watertight seam installation.
 1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet.
 2. Verify field strength of seams a minimum of twice daily, and repair seam sample areas.
 3. Repair tears, voids, and lapped seams in roofing that do not comply with requirements.
- F. Spread sealant bed over deck-drain flange at roof drains, and securely seal roofing in place with clamping ring.

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3.5 BASE FLASHING INSTALLATION

- A. Install sheet flashings and preformed flashing accessories, and adhere to substrates according to roofing system manufacturer's written instructions.
- B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate, and allow to partially dry. Do not apply to seam area of flashing.
- C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.
- D. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.
- E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.6 WALKWAY INSTALLATION

- A. Flexible Walkways: Install walkway products in locations indicated. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.7 PROTECTING AND CLEANING

- A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect, Roofing Engineer of Record, and Owner.
- B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 075419

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SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Manufactured reglets with counterflashing.
2. Formed roof-drainage sheet metal fabrications.
3. Formed low-slope roof sheet metal fabrications.
4. Formed steep-slope roof sheet metal fabrications.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For sheet metal flashing and trim.

1. Include plans, elevations, sections, and attachment details.
2. Distinguish between shop- and field-assembled work.
3. Include identification of finish for each item.
4. Include pattern of seams and details of termination points, expansion joints and expansion-joint covers, direction of expansion, roof-penetration flashing, and connections to adjoining work.

C. Samples: For each exposed product and for each color and texture specified.

1.3 INFORMATIONAL SUBMITTALS

A. Product certificates.

B. Product test reports.

C. Sample warranty.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

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1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.
 - 1. For copings and roof edge flashings that are SPRI ES-1 tested, shop shall be listed as able to fabricate required details as tested and approved.
- B. 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 eave, including built-in gutter, approximately 10 feet (3.0 m) long.

1.6 WARRANTY

- A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies 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, and shall remain watertight.
- B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. Sheet Metal Standard for Copper: Comply with CDA's "Copper in Architecture Handbook." Conform to dimensions and profiles shown unless more stringent requirements are indicated.
- D. SPRI Wind Design Standard: Manufacture and install copings and roof edge flashings tested according to SPRI ES-1 and capable of resisting the following design pressure:
 - 1. Design Pressure: Components and cladding pressures for 100 mph winds.
- E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

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1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
- B. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required.
 1. Exposed Coil-Coated Finish:
 - a. Three-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - b. Provide polymer coated metal where required for heat welding of single-ply membrane.
 2. Color: As selected by Architect from manufacturer's full range.

2.3 UNDERLAYMENT MATERIALS

- A. Felt: ASTM D 226/D 226M, Type II (No. 30), asphalt-saturated organic felt; nonperforated.
- B. Slip Sheet: Rosin-sized building paper, 3 lb/100 sq. ft. (0.16 kg/sq. m) minimum.

2.4 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal.
 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
 - b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
 - c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.

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2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
 3. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
 4. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Series 300 stainless steel or hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.
- C. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
- D. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- E. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- F. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- G. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.
- H. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.5 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
1. Obtain field measurements for accurate fit before shop fabrication.
 2. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
 3. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.
- B. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with butyl sealant concealed within joints.
 2. Use lapped expansion joints only where indicated on Drawings.
- C. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.

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- D. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- E. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard for application, but not less than one thickness heavier than metal being secured.
- F. Seams (unless noted otherwise): Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- G. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength.

2.6 ROOF-DRAINAGE SHEET METAL FABRICATIONS

- A. Hanging Gutters: Fabricate to cross section required, complete with end pieces, outlet tubes, and other accessories as required. Fabricate in minimum 96-inch- (2400-mm-) long sections. Furnish flat-stock gutter brackets and gutter spacers and straps fabricated from same metal as gutters, of size recommended by cited sheet metal standard but with thickness as shown on the drawings. Fabricate expansion joints, expansion-joint covers, and gutter accessories from same metal as gutters. Shop fabricate interior and exterior corners.
- B. Downspouts: Fabricate rectangular downspouts to dimensions indicated, complete with mitered elbows. Furnish with metal hangers from as shown on the drawings. Shop fabricate elbows.
 - 1. Fabricate from the following materials:
 - a. At Connector: Aluminum: 0.040 inch thick.
 - b. Stainless Steel: thickness as shown on the drawings.
 - c. Galvanized Steel: 0.022 inch (0.56 mm) thick.
 - d. At Concourse: Aluminum-Zinc Alloy-Coated Steel: 0.022 inch (0.56 mm) thick.
- C. Parapet Scuppers: Fabricate scuppers to dimensions required, with closure flange trim to exterior, 4-inch- (100-mm-) wide wall flanges to interior, and base extending 4 inches (100 mm) beyond cant or tapered strip into field of roof. Fabricate from the following materials:
 - 1. Of the same material as metal wall panels.

2.7 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Roof Edge Flashing (Gravel Stop) and Fascia Cap: Fabricate in minimum 96-inch- (2400-mm-) long, but not exceeding 12-foot- (3.6-m-) long sections. Furnish with 6-inch- (150-mm-) wide, joint cover plates. Shop fabricate interior and exterior corners.
 - 1. Fabricate from the Following Materials:
 - a. Aluminum: 0.050 inch (1.27 mm) thick.
- B. Copings: Fabricate in minimum 96-inch- (2400-mm-) long, but not exceeding 12-foot- (3.6-m-) long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and interior leg. Miter corners, fasten and seal watertight. Shop fabricate interior and exterior corners.

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1. Fabricate from the Following Materials:
 - a. Aluminum: 0.050 inch (1.27 mm) thick.
- C. Counterflashing and Flashing Receivers: Fabricate from the following materials:
 1. Aluminum: 0.040 inch thick.
- D. Roof-Penetration Flashing: Fabricate from the following materials:
 1. Aluminum: 0.040 inch thick.
- E. Roof-Drain Flashing: Fabricate from the following materials:
 1. Copper: 12 oz./sq. ft. (0.41 mm thick).
 2. Stainless Steel: 0.016 inch (0.40 mm).

2.8 STEEP-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Apron, Step, Cricket, and Backer Flashing: Fabricate from the following materials:
 1. Aluminum-Zinc Alloy-Coated Steel: **0.022 inch (0.56 mm)** thick.
- B. Drip Edges: Fabricate from the following materials:
 1. Aluminum-Zinc Alloy-Coated Steel: **0.022 inch (0.56 mm)** thick.
- C. Eave, Rake, Ridge, and Hip Flashing: Fabricate from the following materials:
 1. Aluminum-Zinc Alloy-Coated Steel: **0.022 inch (0.56 mm)** thick.

PART 3 - EXECUTION

3.1 UNDERLAYMENT INSTALLATION

- A. Felt Underlayment: Install felt underlayment, wrinkle free, using adhesive 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 (50 mm).

3.2 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
 2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

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3. Space cleats not more than 12 inches (300 mm) apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
 4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
 5. Torch cutting of sheet metal flashing and trim is not permitted.
- B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
1. Coat concealed side of stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
 2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet (3 m) unless shown otherwise on the drawings, with no joints within 24 inches (600 mm) of corner or intersection.
1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with sealant concealed within joints.
 2. Use lapped expansion joints only where indicated on Drawings.
- D. Fasteners: Use fastener sizes that penetrate wood blocking or sheathing not less than 1-1/4 inches (32 mm) for nails and not less than 3/4 inch (19 mm) for wood screws. Fasten to metal wall panels not less than recommended by metal wall panel manufacturer to resist wind pressures shown.
- E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- F. Seal joints as required for watertight construction. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."
- G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets with solder to width of 1-1/2 inches (38 mm); however, reduce pre-tinning where pre-tinned surface would show in completed Work.
1. Do not solder metallic-coated steel and aluminum sheet.
 2. Do not use torches for soldering.
 3. Heat surfaces to receive solder, and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
 4. Stainless-Steel Soldering: Tin edges of uncoated sheets, using solder for stainless steel and acid flux. Promptly remove acid flux residue from metal after tinning and soldering. Comply with solder manufacturer's recommended methods for cleaning and neutralization.

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5. Copper Soldering: Tin edges of uncoated sheets, using solder for copper.

H. Rivets: Rivet joints in uncoated aluminum where necessary for strength.

3.3 ROOF-DRAINAGE SYSTEM INSTALLATION

- A. General: Install sheet metal roof-drainage items to produce complete roof-drainage system according to cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.
- B. Hanging Gutters: Join sections with joints sealed with sealant. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchor them in position. Provide end closures and seal watertight with sealant. Slope to downspouts.
 - 1. Install gutter with expansion joints at locations indicated, but not exceeding, 50 feet (15.24 m) apart or as shown on the drawings. Install expansion-joint caps.
- C. Downspouts: Join sections with 1-1/2-inch (38-mm) telescoping joints. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately 60 inches (1500 mm) o.c.
- D. Parapet Scuppers: Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.
- E. Expansion-Joint Covers: Install expansion-joint covers at locations and of configuration indicated. Lap joints minimum of 4 inches (100 mm) in direction of water flow.

3.4 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard. Provide concealed fasteners where possible, and set units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.
- B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate.
- C. Copings: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated.
- D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches (100 mm) over base flashing. Install stainless-steel draw band and tighten.
- E. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend

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counterflashing 4 inches (100 mm) over base flashing. Lap counterflashing joints minimum of 4 inches (100 mm).

- F. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

3.5 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.
- C. Clean off excess sealants.
- D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.

END OF SECTION 076200

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SECTION 078443 - JOINT FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Joints in or between fire-resistance-rated constructions.
2. Joints at exterior curtain-wall/floor intersections.
3. Joints in smoke barriers.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Product Schedule: For each joint firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing agency.

1. Engineering Judgments: Where Project conditions require modification to a qualified testing agency's illustration for a particular joint firestopping system condition, submit illustration, with modifications marked, approved by joint firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

1.3 INFORMATIONAL SUBMITTALS

A. Product test reports.

1.4 CLOSEOUT SUBMITTALS

A. Installer Certificates: From Installer indicating that joint firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with UL's "Qualified Firestop Contractor Program Requirements."

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PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics:

1. Perform joint firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
2. Test per testing standards referenced in "Joint Firestopping Systems" Article. Provide rated systems complying with the following requirements:
 - a. Joint firestopping systems shall bear classification marking of a qualified testing agency.
 - 1) UL in its "Fire Resistance Directory."

2.2 JOINT FIRESTOPPING SYSTEMS

- A. Joint Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which joint firestopping systems are installed. Joint firestopping systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases.
- B. Joints in or between Fire-Resistance-Rated Construction: Provide joint firestopping systems with ratings determined per ASTM E 1966 or UL 2079.
 1. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of the wall, floor, or roof in or between which it is installed.
- C. Joints at Exterior Curtain-Wall/Floor Intersections: Provide joint firestopping systems with rating determined per ASTM E 2307.
 1. F-Rating: Equal to or exceeding the fire-resistance rating of the floor assembly.
- D. Joints in Smoke Barriers: Provide fire-resistive joint systems with ratings determined per UL 2079 based on testing at a positive pressure differential of 0.30-inch wg.
 1. L-Rating: Not exceeding 5.0 cfm/ft. of joint at both ambient and elevated temperatures.
- E. Exposed Joint Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.
- F. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install elastomeric fill materials and to maintain ratings required. Use only components specified by joint firestopping system manufacturer and approved by the qualified testing agency for conditions indicated.

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PART 3 - EXECUTION

3.1 INSTALLATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance of the Work.
- B. General: Install fire-resistive joint systems to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.
- C. Install forming materials and other accessories of types required to support elastomeric fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
 - 1. After installing elastomeric fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint system.
- D. Install elastomeric fill materials for fire-resistive joint systems by proven techniques to produce the following results:
 - 1. Elastomeric fill voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.
 - 2. Apply elastomeric fill materials so they contact and adhere to substrates formed by joints.
 - 3. For elastomeric fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.2 IDENTIFICATION

- A. Joint Identification: Identify joint firestopping systems with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of joint edge so labels are visible to anyone seeking to remove or joint firestopping system. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
 - 1. The words "Warning - Joint Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
 - 2. Contractor's name, address, and phone number.
 - 3. Designation of applicable testing agency.
 - 4. Date of installation.
 - 5. Manufacturer's name.
 - 6. Installer's name.

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3.3 FIELD QUALITY CONTROL

- A. Inspecting Agency: Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E 2393.
- B. Where deficiencies are found or joint firestopping systems are damaged or removed due to testing, repair or replace joint firestopping systems so they comply with requirements.
- C. Proceed with enclosing joint firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

END OF SECTION 078443

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SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Silicone joint sealants.

1.2 ACTION SUBMITTALS

- A. Product Data:** For each joint-sealant product.
- B. Samples:** For each kind and color of joint sealant required.

1.3 INFORMATIONAL SUBMITTALS

- A. Product test reports.**
- B. Preconstruction laboratory test reports.**
- C. Preconstruction field-adhesion-test reports.**
- D. Field-adhesion-test reports.**
- E. Sample warranties.**

1.4 QUALITY ASSURANCE

- A. Testing Agency Qualifications:** Qualified according to ASTM C 1021 to conduct the testing indicated.

1.5 WARRANTY

- A. Special Installer's Warranty:** Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
1. **Warranty Period:** Two years from date of Substantial Completion.

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- B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

- 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

- A. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

- A. Silicone, S, NS, 100/50, NT: Single-component, non-sag, plus 100 percent and minus 50 percent movement capability, non-traffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.

- 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

- a. GE Construction Sealants; Momenive Performance Materials Inc.

2.3 JOINT-SEALANT BACKING

- A. 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.
- B. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer.

2.4 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.
- C. Masking Tape: Non-staining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

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PART 3 - EXECUTION

3.1 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 laitance and form-release agents from concrete.
 - 2. 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.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces.

3.2 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with ASTM C 1193 and joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. 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.
- C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- D. 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.
- E. Tooling of Non-sag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 1. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.

END OF SECTION 079200

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SECTION 079513.13 - INTERIOR EXPANSION JOINT COVER ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes interior expansion joint cover assemblies.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For each expansion joint cover assembly.
 - 1. Include plans, elevations, sections, details, splices, block-out requirement, attachments to other work, and line diagrams.
- C. Samples: For each expansion joint cover assembly and for each color and texture specified.

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTION

- A. Furnish units in longest practicable lengths to minimize field splicing.
- B. Include factory-fabricated closure materials and transition pieces, T-joints, corners, curbs, cross-connections, and other accessories as required to provide continuous expansion joint cover assemblies.

2.2 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Expansion joint cover assemblies shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- B. Fire-Resistance Ratings: Provide expansion joint cover assemblies with fire barriers identical to those of systems tested for fire resistance according to UL 2079 or ASTM E 1966 by a qualified testing agency.
- C. Expansion Joint Design Criteria:
 - 1. Type of Movement: Wind sway.
 - a. Nominal Joint Width: As indicated on Drawings.

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- b. Minimum Joint Width: As indicated on Drawings.
 - c. Maximum Joint Width: As indicated on Drawings.
2. Type of Movement: Seismic.
- a. Joint Movement: As indicated on Drawings.

2.3 FLOOR EXPANSION JOINT COVERS

- A. Metal-Plate Floor Joint Cover: Metal cover plate fixed on one side of joint gap and free to slide on other.
- 1. Application: Floor to floor.
 - 2. Installation: Recessed.
 - 3. Load Capacity:
 - a. Uniform Load: 50 lb/sq. ft..
 - b. Concentrated Load: 300 lb.
 - c. Maximum Deflection: 0.0625 inch.
 - 4. Cover-Plate Design: Recessed to accept field-applied finish materials.
 - a. Recess depth: Depth sufficient for continuation of adjacent flooring materials.
 - 5. Products: Basis-of-Design Construction Specialties, Inc. model SGR dual-elastomeric seal.
 - a. Alternate Manufacturers:
 - 1) Inpro Corp.
 - 2) Balco.

2.4 WALL EXPANSION JOINT COVERS

- A. Dual-Elastomeric-Seal Wall Joint Cover: Assembly consisting of dual-elastomeric seals and center plate anchored to frames fixed to sides of joint gap.
- 1. Application: Wall to wall.
 - 2. Center-Plate Design: Recessed to accept gypsum board or wall tile.
 - 3. Exposed Metal:
 - a. Aluminum: Manufacturer's standard.
 - 1) Color: As selected by Architect from full range of industry colors and color densities.
 - 4. Seal: Preformed elastomeric membranes or extrusions.
 - a. Color: As selected by Architect from manufacturer's full range.

2.5 CEILING EXPANSION JOINT COVERS

- A. Elastomeric-Seal Ceiling Joint Cover: Assembly consisting of elastomeric seal anchored to frames fixed to sides of joint gap.

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1. Application: Ceiling to ceiling.
 - a. Aluminum: Manufacturer's standard.
2. Seal: Preformed elastomeric membranes or extrusions.
 - a. Color: As selected by Architect from manufacturer's full range.

2.6 MATERIALS

- A. Aluminum: ASTM B 221, Alloy 6063-T5 for extrusions; ASTM B 209, Alloy 6061-T6 for sheet and plate.
- B. Elastomeric Seals: Manufacturer's standard preformed elastomeric membranes or extrusions to be installed in metal frames.
- C. Moisture Barrier: Manufacturer's standard, flexible elastomeric material.
- D. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M.

2.7 ALUMINUM FINISHES

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

2.8 ACCESSORIES

- A. Moisture Barriers: Manufacturer's standard continuous, waterproof membrane within joint and attached to substrate on sides of joint.
 1. Provide where indicated on Drawings.
- B. Manufacturer's standard attachment devices, as indicated or required for complete installations.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Prepare substrates according to expansion joint cover assembly manufacturer's written instructions.
- B. Coordinate and furnish anchorages, setting drawings, and instructions for installing expansion joint cover assemblies.

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- C. Comply with manufacturer's written instructions for storing, handling, and installing expansion joint cover assemblies and materials unless more stringent requirements are indicated.
- D. Metal Frames: Perform cutting, drilling, and fitting required to install expansion joint cover assemblies.
 - 1. Repair or grout block out as required for continuous frame support using nonmetallic, shrinkage-resistant grout.
 - 2. Install frames in continuous contact with adjacent surfaces.
 - a. Shimming is not permitted.
 - 3. Install in true alignment and proper relationship to joints and adjoining finished surfaces measured from established lines and levels.
 - 4. Adjust for differences between actual structural gap and nominal design gap due to ambient temperature at time of installation.
 - 5. Cut and fit ends to accommodate thermal expansion and contraction of metal without buckling of frames.
 - 6. Locate anchors at interval recommended by manufacturer, but not less than 3 inches from each end and not more than 24 inches o.c.
- E. Seals: Install elastomeric seals and membranes in frames to comply with manufacturer's written instructions. Install with minimum number of end joints.
 - 1. Provide in continuous lengths for straight sections.
 - 2. Seal transitions. Vulcanize or heat-weld field-spliced joints as recommended by manufacturer.
 - 3. Installation: Mechanically lock seals into frames or adhere to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.
- F. Install with hairline mitered corners where expansion joint cover assemblies change direction or abut other materials.
- G. Terminate exposed ends of expansion joint cover assemblies with field- or factory-fabricated termination devices.
- H. Moisture Barrier Drainage: If indicated, provide drainage fittings and connect to drains.

3.2 PROTECTION

- A. Do not remove protective covering until finish work in adjacent areas is complete.
- B. Protect the installation from damage by work of other Sections.

END OF SECTION 079513.13

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SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes hollow-metal work.

1.2 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include elevations, door edge details, frame profiles, metal thicknesses, preparations for hardware, and other details.
- C. Schedule: Prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings.

1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.

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. Ceco Door; ASSA ABLOY.
 - 2. Curries Company; ASSA ABLOY.
 - 3. Steelcraft; an Allegion brand.

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2.2 REGULATORY REQUIREMENTS

- A. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings and temperature-rise limits indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
 - 1. Smoke- and Draft-Control Assemblies: Provide an assembly with gaskets listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.
- B. Fire-Rated, Borrowed-Lite Assemblies: Complying with NFPA 80 and listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9.

2.3 INTERIOR DOORS AND FRAMES

- A. Heavy-Duty Doors and Frames: SDI A250.8, Level 2.
 - 1. Physical Performance: Level B according to SDI A250.4.
 - 2. Doors:
 - a. Type: As indicated in the Door and Frame Schedule.
 - b. Thickness: 1-3/4 inches.
 - c. Edge Construction: Model 2, Seamless.
 - d. Core: Manufacturer's standard.
 - 3. Frames:
 - a. Materials: Uncoated, steel sheet, minimum thickness of 0.053 inch.
 - b. Sidelite and Transom Frames: Fabricated from same thickness material as adjacent door frame.
 - c. Construction: Full profile welded.
 - 4. Exposed Finish: Prime.

2.4 EXTERIOR HOLLOW-METAL DOORS AND FRAMES

- A. Extra-Heavy-Duty Doors and Frames: SDI A250.8, Level 3.
 - 1. Physical Performance: Level A according to SDI A250.4.
 - 2. Doors:
 - a. Type: As indicated in the Door and Frame Schedule.
 - b. Thickness: 1-3/4 inches.
 - c. Face: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A40 coating.

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- d. Edge Construction: Model 2, Seamless.
- e. Core: Manufacturer's standard insulation material.
- 3. Thermal-Rated Doors: Provide doors fabricated with thermal-resistance value (R-value) of not less than 2.1 deg F x h x sq. ft./Btu when tested according to ASTM C 1363.
- 4. Frames:
 - a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A40 coating.
 - b. Construction: Full profile welded.
- 5. Exposed Finish: Prime.

2.5 BORROWED LITES

- A. Hollow-metal frames of uncoated steel sheet, minimum thickness of 0.053 inch.
- B. Construction: Full profile welded.

2.6 FRAME ANCHORS

- A. Jamb Anchors:
 - 1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
 - 2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
 - 3. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.
 - 4. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch-diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.
- B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch, and as follows:
 - 1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
 - 2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at finish floor surface.

2.7 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

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- B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.
- D. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.
 - 1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.
- E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.
- F. Power-Actuated Fasteners in Concrete: From corrosion-resistant materials.
- G. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.
- H. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing).
- I. Glazing: Section 088000 "Glazing."

2.8 FABRICATION

- A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
- B. Hollow-Metal Doors:
 - 1. Exterior Doors: Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
 - 2. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated.
- C. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
 - 1. Sidelite and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
 - 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.

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4. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
5. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Masonry Type: Locate anchors not more than 16 inches from top and bottom of frame. Space anchors not more than 32 inches o.c., to match coursing, and as follows:
 - 1) Three anchors per jamb from 60 to 90 inches high.
 - b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Four anchors per jamb from 60 to 90 inches high.
6. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers.
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
 - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
- D. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.
 1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
 2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.
- E. Stops and Moldings: Provide stops and moldings around glazed lites and louvers where indicated. Form corners of stops and moldings with mitered hairline joints.
 1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow-metal work.
 2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
 3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
 4. Provide loose stops and moldings on inside of hollow-metal work.
 5. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

2.9 STEEL FINISHES

- A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
 1. Shop Primer: SDI A250.10.

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2.10 ACCESSORIES

- A. Louvers: Provide sightproof louvers for interior doors, where indicated, which comply with SDI 111C, with blades or baffles formed of 0.020-inch-thick, cold-rolled steel sheet set into 0.032-inch-thick steel frame.
 - 1. Fire-Rated Automatic Louvers: Movable blades closed by actuating fusible link, and listed and labeled for use in fire-rated door assemblies of type and fire-resistance rating indicated.
- B. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.
- C. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Hollow-Metal Frames: Install hollow-metal frames for doors, transoms, sidelites, borrowed lites, and other openings, of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.
 - 1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - a. At fire-rated openings, install frames according to NFPA 80.
 - b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
 - c. Install frames with removable stops located on secure side of opening.
 - d. Install door silencers in frames before grouting.
 - e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - f. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 - 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
 - a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
 - 3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
 - 4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.

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5. Concrete Walls: Solidly fill space between frames and concrete with mineral-fiber insulation.
 6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 7. In-Place Metal or Wood-Stud Partitions: Secure slip-on drywall frames in place according to manufacturer's written instructions.
 8. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch, 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.
- B. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.
1. Non-Fire-Rated Steel Doors:
 - a. Between Door and Frame Jambs and Head: 1/8 inch plus or minus 1/32 inch.
 - b. Between Edges of Pairs of Doors: 1/8 inch to 1/4 inch plus or minus 1/32 inch.
 - c. At Bottom of Door: 3/4 inch plus or minus 1/32 inch.
 - d. Between Door Face and Stop: 1/16 inch to 1/8 inch plus or minus 1/32 inch.
 2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
 3. Smoke-Control Doors: Install doors and gaskets according to NFPA 105.
- C. Glazing: Comply with installation requirements in Section 088000 "Glazing" and with hollow-metal manufacturer's written instructions.
1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

3.2 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.
- B. Remove grout and other bonding material from hollow-metal work immediately after installation.
- C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

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- D. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.
- E. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 081113

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SECTION 081416 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Solid-core doors with wood-veneer faces.
2. Factory finishing flush wood doors.
3. Factory fitting flush wood doors to frames and factory machining for hardware.

B. Related Requirements:

1. Section 088000 "Glazing" for glass view panels in flush wood doors.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of door. Include factory-finishing specifications.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and the following:

1. Dimensions and locations of blocking.
2. Dimensions and locations of mortises and holes for hardware.
3. Dimensions and locations of cutouts.
4. Undercuts.
5. Requirements for veneer matching.
6. Doors to be factory finished and finish requirements.
7. Fire-protection ratings for fire-rated doors.

1.3 INFORMATIONAL SUBMITTALS

A. Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

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. Algoma Hardwoods, Inc.

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2. Mohawk Flush Doors, Inc.

2.2 FLUSH WOOD DOORS, GENERAL

- A. Quality Standard: In addition to requirements specified, comply with AWI's, AWMAC's, and WI's "Architectural Woodwork Standards."
 - 1. Provide AWI Quality Certification Labels indicating that doors comply with requirements of grades specified.
- B. WDMA I.S.1-A Performance Grade:
 - 1. Extra Heavy Duty.
- C. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252.
 - 1. Cores: Provide core specified or mineral core as needed to provide fire-protection rating indicated.
 - 2. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.
 - 3. Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.
- D. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control, based on testing according to UL 1784.
- E. Particleboard-Core Doors:
 - 1. Particleboard: ANSI A208.1, Grade LD-1.
 - 2. Blocking: Provide wood blocking in particleboard-core doors as needed to eliminate through-bolting hardware.
 - 3. Provide doors with glued-wood-stave cores instead of particleboard cores for doors indicated to receive exit devices.

2.3 VENEER-FACED DOORS FOR TRANSPARENT FINISH

- A. Interior Solid-Core Doors:
 - 1. Grade: Premium, with Grade A faces.
 - 2. Species: Red oak.
 - 3. Cut: Rotary cut.
 - 4. Match between Veneer Leaves: Book match.
 - 5. Assembly of Veneer Leaves on Door Faces: Center-balance match.
 - 6. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.

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7. Core: Particleboard.
8. Construction: Five or seven plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering. Faces are bonded to core using a hot press.
9. Construction: Seven plies, either bonded or nonbonded construction.

2.4 LIGHT FRAMES AND LOUVERS

- A. Metal Frames for Light Openings in Fire-Rated Doors: Manufacturer's standard frame formed of 0.048-inch-thick, cold-rolled steel sheet; factory primed for paint with baked-enamel- or powder-coated finish; and approved for use in doors of fire-protection rating indicated.

2.5 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
 1. Comply with NFPA 80 requirements for fire-rated doors.
- B. Factory machine doors for hardware that is not surface applied.
- C. Openings: Factory cut and trim openings through doors.
 1. Light Openings: Trim openings with moldings of material and profile indicated.
 2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 088000 "Glazing."

2.6 FACTORY FINISHING

- A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
 1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on bottom edges, edges of cutouts, and mortises.
- B. Factory finish doors that are indicated to receive transparent finish.
- C. Transparent Finish:
 1. Grade: Premium.
 2. Finish: AWT's, AWMAC's, and WI's "Architectural Woodwork Standards" System 11, catalyzed polyurethane.
 3. Finish: WDMA TR-6 catalyzed polyurethane.
 4. Staining: As selected by Architect from manufacturer's full range.
 5. Sheen: Satin.

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PART 3 - EXECUTION

3.1 INSTALLATION

- A. Hardware: For installation, see Section 087100 "Door Hardware."
- B. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
 - 1. Install fire-rated doors according to NFPA 80.
 - 2. Install smoke- and draft-control doors according to NFPA 105.
- C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
 - 1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold unless otherwise indicated.
 - a. Comply with NFPA 80 for fire-rated doors.
- D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- E. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

END OF SECTION 081416

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SECTION 084113 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exterior storefront framing.
2. Exterior manual-swing entrance doors and door-frame units.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include plans, elevations, sections, full-size details, and attachments to other work.

1. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.

C. Entrance Door Hardware Schedule: Prepared by or under supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams.

1.3 INFORMATIONAL SUBMITTALS

A. Energy Performance Certificates: NFRC-certified energy performance values from manufacturer.

B. Product test reports.

C. Field quality-control reports.

D. Sample warranties.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

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1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.

1.6 WARRANTY

- A. Special Warranty: Installer agrees to repair or replace components of aluminum-framed entrances and storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
 - 1. Aluminum-framed entrances and storefronts shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
 - 2. Failure also includes the following:
 - a. Thermal stresses transferring to building structure.
 - b. Glass breakage.
 - c. Noise or vibration created by wind and thermal and structural movements.
 - d. Loosening or weakening of fasteners, attachments, and other components.
 - e. Failure of operating units.

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2.2 MANUFACTURERS

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. US Aluminum
 - b. Kawneer

2.3 FRAMING

- A. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads. Use Kawneer Clearwall SBI system for all exterior wall units and Kawneer 450 system for all interior partition units as the basis of design.
 1. Construction: Thermally broken at all exterior units.
 2. Glazing System: Retained mechanically with gaskets on four sides.
 3. Glazing Plane: Front.
 4. Finish: Color anodic finish for all units located within the exterior wall and clear anodic finish for all units located entirely on the interior of the building.
 5. Fabrication Method: Field-fabricated stick system.
- B. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.
- C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- D. Materials:
 1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 - a. Sheet and Plate: ASTM B 209.
 - b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
 - c. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.
 - d. Structural Profiles: ASTM B 308/B 308M.

2.4 ENTRANCE DOOR SYSTEMS

- A. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing operation.
 1. Door Construction: 1-3/4-inch overall thickness, with minimum 0.125-inch- thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with

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reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.

2. Door Design: Wide stile; 5-inch nominal width.
3. Glazing Stops and Gaskets: Beveled, snap-on, extruded-aluminum stops and preformed gaskets.

2.5 ENTRANCE DOOR HARDWARE

- A. General: Provide entrance door hardware and entrance door hardware sets indicated in door and frame schedule for each entrance door to comply with requirements in this Section.
 1. Entrance Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and named manufacturers' products.
 2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
 3. Opening-Force Requirements:
 - a. Egress Doors: Not more than 15 lbf to release the latch and not more than 30 lbf to set the door in motion and not more than 15 lbf to open the door to its minimum required width.
 - b. Accessible Interior Doors: Not more than 5 lbf to fully open door.
- B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of entrance door hardware are indicated in "Entrance Door Hardware Sets" Article. Products are identified by using entrance 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 "Entrance Door Hardware Sets" Article.
- C. Pivot Hinges: BHMA A156.4, Grade 1.
 1. Offset-Pivot Hinges: Provide top, bottom, and intermediate offset pivots at each door leaf.
- D. Manual Flush Bolts: BHMA A156.16, Grade 1.
- E. Panic Exit Devices: BHMA A156.3, Grade 1, listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.
- F. Cylinders: As specified in Section 087100 "Door Hardware."
- G. Strikes: Provide strike with black-plastic dust box for each latch or lock bolt; fabricated for aluminum framing.

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- H. Operating Trim: BHMA A156.6.
- I. Closers: BHMA A156.4, Grade 1, with accessories required for a complete installation, sized as required by door size, exposure to weather, and anticipated frequency of use; adjustable to comply with field conditions and requirements for opening force.
- J. Weather Stripping: Manufacturer's standard replaceable components.
- K. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.
- L. Silencers: BHMA A156.16, Grade 1.
- M. Thresholds: BHMA A156.21, raised thresholds beveled with a slope of not more than 1:2, with maximum height of 1/2 inch.

2.6 GLAZING

- A. Glazing: Comply with Section 088000 "Glazing."
- B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.
- C. Glazing Sealants: As recommended by manufacturer.

2.7 FABRICATION

- A. Form or extrude aluminum shapes before finishing.
- B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- C. Fabricate components that, when assembled, have the following characteristics:
 - 1. Profiles that are sharp, straight, and free of defects or deformations.
 - 2. Accurately fitted joints with ends coped or mitered.
 - 3. Physical and thermal isolation of glazing from framing members.
 - 4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 - 5. Provisions for field replacement of glazing from exterior.
 - 6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

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- E. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
- F. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
- G. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.
- H. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.8 ALUMINUM FINISHES

- A. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General:
 - 1. Comply with manufacturer's written instructions.
 - 2. Do not install damaged components.
 - 3. Fit joints to produce hairline joints free of burrs and distortion.
 - 4. Rigidly secure nonmovement joints.
 - 5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
 - 6. Seal perimeter and other joints watertight unless otherwise indicated.
- B. Metal Protection:
 - 1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
 - 2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Set continuous sill members and flashing in full sealant bed as specified in Section 079200 "Joint Sealants" to produce weathertight installation.
- D. Install components plumb and true in alignment with established lines and grades.

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- E. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.
- F. Install glazing as specified in Section 088000 "Glazing."
- G. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.
 - 1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
 - 2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

END OF SECTION 084113

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SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Mechanical door hardware for the following:
 - a. Swinging doors.
2. Cylinders for door hardware specified in other Sections.
3. Electrified door hardware.

1.2 PREINSTALLATION MEETINGS

- ##### A. Keying Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

- ##### A. Product Data: For each type of product.
- ##### B. Shop Drawings: For electrified door hardware.
1. Include diagrams for power, signal, and control wiring.
 2. Include details of interface of electrified door hardware and building safety and security systems.
- ##### C. Door hardware schedule.
- ##### D. Keying schedule.

1.4 INFORMATIONAL SUBMITTALS

- ##### A. Sample warranty.

1.5 CLOSEOUT SUBMITTALS

- ##### A. Maintenance data.

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1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and of an Architectural Hardware Consultant who is available during the course of the Work to consult Contractor, Architect, and Owner about door hardware and keying.
 - 1. Scheduling Responsibility: Preparation of door hardware and keying schedule.
 - 2. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
- B. Architectural Hardware Consultant Qualifications: A person 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 and who is currently certified by DHI as an Architectural Hardware Consultant (AHC) and an Electrified Hardware Consultant (EHC).

1.7 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Three years from date of Substantial Completion unless otherwise indicated below:
 - a. Electromagnetic Locks: Five years from date of Substantial Completion.
 - b. Exit Devices: Two years from date of Substantial Completion.
 - c. Manual Closers: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Door Assemblies: Where fire-rated doors are indicated, provide door hardware complying with NFPA 80 that is listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
- B. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that complies with requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
 - 1. Air Leakage Rate: Maximum air leakage of 0.3 cfm/sq. ft. at the tested pressure differential of 0.3-inch wg of water.

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- C. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- D. Means of Egress Doors: Latches do not require more than 15 lbf to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.
- E. Accessibility Requirements: For door hardware on doors in an accessible route, comply with the DOT's "ADA Standards for Transportation Facilities".

2.2 SCHEDULED DOOR HARDWARE

- A. Provide products for each door that comply with requirements indicated in Part 2 and door hardware schedule.

- 1. Door hardware is scheduled on Drawings.

2.3 HINGES

- A. Hinges: BHMA A156.1. Provide template-produced hinges for hinges installed on hollow-metal doors and hollow-metal frames.

- 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. Allegion plc.
 - b. McKinney Products Company; an ASSA ABLOY Group company.
 - c. Stanley Commercial Hardware; a division of Stanley Security Solutions.

2.4 MECHANICAL LOCKS AND LATCHES

- A. Lock Functions: As indicated in door hardware schedule.
- B. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:

- 1. Bored Locks: Minimum 1/2-inch latchbolt throw.
 - 2. Mortise Locks: Minimum 3/4-inch latchbolt throw.
 - 3. Deadbolts: Minimum 1-inch bolt throw.

- C. Lock Backset: 2-3/4 inches unless otherwise indicated.

- D. Lock Trim:

- 1. Description: Basis of design shall be Allegion Schlage L9000-Series Mortise Lock.
 - 2. Levers: Forged.

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- a. 03 Lever in Satin Stainless Steel.
3. Escutcheons (Roses): Forged.
4. Dummy Trim: Match lever lock trim and escutcheons.
- E. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.
 1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
 2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
 3. Aluminum-Frame Strike Box: Manufacturer's special strike box fabricated for aluminum framing.
 4. Rabbet Front and Strike: Provide on locksets for rabbeted meeting stiles.
- F. Mortise Locks: BHMA A156.13; Security Grade 1; stamped steel case with steel or brass parts; Series 1000.
 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. Allegion plc.
 - b. Best Access Systems; Stanley Security Solutions, Inc.
 - c. Yale Security Inc; an ASSA ABLOY Group company.

2.5 ELECTRIC STRIKES

- A. Electric Strikes: BHMA A156.31; [**Grade 1**] [**Grade 2**]; with faceplate to suit lock and frame.
 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. Allegion plc.
 - b. Hager Companies.
 - c. Stanley Commercial Hardware; a division of Stanley Security Solutions.

2.6 EXIT LOCKS AND EXIT ALARMS

- A. Exit Locks and Alarms: BHMA A156.29, Grade 1.
 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:

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- a. SARGENT Manufacturing Company; ASSA ABLOY.

2.7 MANUAL FLUSH BOLTS

- A. Manual Flush Bolts: BHMA A156.16; minimum 3/4-inch throw; designed for mortising into door edge.
 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. Allegion plc.
 - b. Trimco.

2.8 EXIT DEVICES AND AUXILIARY ITEMS

- A. Exit Devices and Auxiliary Items: BHMA A156.3.
 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. Allegion plc.
 - b. Stanley Commercial Hardware; a division of Stanley Security Solutions.
 - c. Yale Security Inc; an ASSA ABLOY Group company.

2.9 LOCK CYLINDERS

- A. Lock Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver. Provide cylinder from same manufacturer of locking devices.
 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. Allegion plc.
 - b. Best Access Systems; Stanley Security Solutions, Inc.
 - c. Yale Security Inc; an ASSA ABLOY Group company.
- B. Standard Lock Cylinders: BHMA A156.5; Grade 1 permanent cores; face finished to match lockset.
 1. Core Type: Interchangeable.
- C. High-Security Lock Cylinders: BHMA A156.30; Grade 1 permanent cores that are removable; face finished to match lockset.

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1. Type: M, mechanical.

- D. Construction Master Keys: Provide cylinders with feature that permits voiding of construction keys without cylinder removal. Provide 10 construction master keys.
- E. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide 10 construction master keys.

2.10 KEYING

- A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, appendix. Provide one extra key blank for each lock. Incorporate decisions made in keying conference.

1. Master Key System: Change keys and a master key operate cylinders.
 - a. Provide three cylinder change keys and five master keys.
2. Grand Master Key System: Change keys, a master key, and a grand master key operate cylinders.
 - a. Provide three cylinder change keys and five each of master and grand master keys.
3. Existing System:
 - a. Master key or grand master key locks to Owner's existing system.
 - b. Re-key Owner's existing master key system into new keying system.
4. Keyed Alike: Key all cylinders to same change key.

- B. Keys: Brass.

1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:
 - a. Notation: "DO NOT DUPLICATE."

2.11 OPERATING TRIM

- A. Operating Trim: BHMA A156.6; stainless steel unless otherwise 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. Hager Companies.
 - b. Schlage
 - c. Best

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2.12 ACCESSORIES FOR PAIRS OF DOORS

- A. Astragals: BHMA A156.22.

2.13 SURFACE CLOSERS

- A. Surface Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written instructions for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

- 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. DORMA USA, Inc.
- b. Norton Door Controls; an ASSA ABLOY Group company.
- c. SARGENT Manufacturing Company; ASSA ABLOY.
- d. Stanley Commercial Hardware; a division of Stanley Security Solutions.
- e. Yale Security Inc; an ASSA ABLOY Group company.

2.14 MECHANICAL STOPS AND HOLDERS

- A. Wall- and Floor-Mounted Stops: BHMA A156.16.

- 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. Hager Companies.
- b. Rockwood Manufacturing Company; an ASSA ABLOY Group company.
- c. Trimco.

2.15 DOOR GASKETING

- A. Door Gasketing: BHMA A156.22; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.

- 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. Hager Companies.
- b. National Guard Products, Inc.
- c. Pemko Manufacturing Co.

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- B. Maximum Air Leakage: When tested according to ASTM E 283 with tested pressure differential of 0.3-inch wg, as follows:

1. Smoke-Rated Gasketing: 0.3 cfm/sq. ft. of door opening.
2. Gasketing on Single Doors: 0.3 cfm/sq. ft. of door opening.
3. Gasketing on Double Doors: 0.50 cfm per foot of door opening.

2.16 THRESHOLDS

- A. Thresholds: BHMA A156.21; fabricated to full width of opening 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. Hager Companies.
 - b. National Guard Products, Inc.
 - c. Pemko Manufacturing Co.

2.17 METAL PROTECTIVE TRIM UNITS

- A. Metal Protective Trim Units: BHMA A156.6; fabricated from 0.050-inch-thick stainless steel; with manufacturer's standard machine or self-tapping screw fasteners.

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. Hager Companies.
 - b. Rockwood Manufacturing Company; an ASSA ABLOY Group company.
 - c. Trimco.

2.18 AUXILIARY ELECTRIFIED DOOR HARDWARE

- A. Auxiliary Electrified Door Hardware:

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. DORMA USA, Inc.
 - b. Hager Companies.
 - c. SARGENT Manufacturing Company; ASSA ABLOY.

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2.19 FINISHES

- A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.
 - 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
 - 2. Custom Steel Doors and Frames: HMMA 831.
 - 3. Wood Doors: DHI's "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work. Do not install surface-mounted items until finishes have been completed on substrates involved.
- C. Hinges: Install types and in quantities indicated in door hardware schedule, but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
- D. Lock Cylinders: Install construction cores to secure building and areas during construction period.
 - 1. Replace construction cores with permanent cores as directed by Owner.
 - 2. Furnish permanent cores to Owner for installation.
- E. Boxed Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings. Verify location with Architect.
 - 1. Configuration: Provide one power supply for each door opening with electrified door hardware.
- F. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 079200 "Joint Sealants."
- G. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.
- H. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

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1. Do not notch perimeter gasketing to install other surface-applied hardware.

I. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

J. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.2 ADJUSTING

A. Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.3 DOOR HARDWARE SCHEDULE

A. See plans for door hardware schedule.

END OF SECTION 087100

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SECTION 088000 - GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Glass for windows, doors, interior borrowed lites, storefront framing, and glazed curtain walls.
2. Glazing sealants and accessories.

1.2 COORDINATION

- ##### A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.3 ACTION SUBMITTALS

- ##### A. Product Data: For each type of product.
- ##### B. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches square.
- ##### C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

- ##### A. Preconstruction adhesion and compatibility test report.

1.5 QUALITY ASSURANCE

- ##### A. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

1.6 WARRANTY

- ##### A. Manufacturer's Special Warranty for Coated-Glass Products: 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

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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 for Laminated Glass: Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1. Warranty Period: 10 years from date of Substantial Completion.

- C. Manufacturer's Special Warranty for 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 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. Guardian Industries Corp.; SunGuard.
2. Pilkington North America.
3. PPG Flat Glass; PPG Industries, Inc.

- B. Tinted Annealed Float Glass: ASTM C 1036, Type I, Class 2 (tinted), Quality-Q3.

- C. Fully Tempered Float Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.

2.2 LAMINATED GLASS

- A. Laminated Glass: ASTM C 1172. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.

1. Construction: Laminate glass with polyvinyl butyral interlayer to comply with interlayer manufacturer's written instructions.

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2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
3. Interlayer Color: Clear unless otherwise indicated.

2.3 INSULATING GLASS

- A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190.
 1. Sealing System: Dual seals.
 2. Spacer: Manufacturer's standard spacer material and construction.

2.4 GLAZING SEALANTS

- A. General:
 1. Compatibility: Compatible with one another and with other materials they 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. 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. Dow Corning Corporation.
 - b. Sika Corporation.
 - c. Tremco Incorporated.

2.5 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.

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2.6 MISCELLANEOUS GLAZING MATERIALS

- A. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- B. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- C. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- D. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- E. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

PART 3 - EXECUTION

3.1 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.
- B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.
- C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- D. 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.
- E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- F. Provide spacers for glass lites where length plus width is larger than 50 inches.
- G. 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.

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3.2 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.
- 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, then to jambs. Cover horizontal framing joints by applying tapes to jambs, 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. Apply heel bead of elastomeric sealant.
- F. 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.
- G. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.3 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.

3.4 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 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.

3.5 CLEANING AND PROTECTION

- A. Immediately after installation remove nonpermanent labels and clean surfaces.

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- B. Protect glass from contact with contaminating substances resulting from construction operations. 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.
 - 1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.
- C. Remove and replace glass that is damaged during construction period.

3.6 MONOLITHIC GLASS SCHEDULE

- A. Glass Type GL-1: Ultraclear fully tempered float glass.
 - 1. Basis-of-Design Product: PPG Industries, Inc.; Starphire.
 - 2. Minimum Thickness: 0.25 inches
 - 3. Safety glazing required.
- B. Glass Type GL-2: Tinted fully tempered float glass.
 - 1. Basis-of-Design Product: PPG Industries, Inc.; Starphire.
 - 2. Tint Color: Gray.
 - 3. Minimum Thickness: 0.25 inches.
 - 4. Safety glazing required.

3.7 LAMINATED GLASS SCHEDULE

- A. Glass Type GL-3: Clear laminated glass with two plies of annealed float glass.
 - 1. Basis-of-Design Product: PPG Industries, Inc.; Starphire.
 - 2. Minimum Thickness of Each Glass Ply: 0.125 inches.
 - 3. Interlayer Thickness: 0.030 inch.
 - 4. Safety glazing required.

3.8 INSULATING GLASS SCHEDULE

- A. Glass Type GL-4: Low-E-coated, tinted insulating glass.
 - 1. Basis-of-Design Product: PPG Industries, Inc.; OPTIGRAY + SUNGATE 400.
 - 2. Overall Unit Thickness: 1 inch.
 - 3. Minimum Thickness of Each Glass Lite: 0.125 inches.
 - 4. Outdoor Lite: Tinted fully tempered float glass.
 - 5. Tint Color: Gray.
 - 6. Interspace Content: Argon.
 - 7. Indoor Lite: Clear fully tempered float glass.

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8. Low-E Coating: Pyrolytic on second surface.
9. Winter Nighttime U-Factor: U-0.45 maximum.
10. Summer Daytime U-Factor: U-0.45 maximum.
11. Safety glazing required.

3.9 INSULATING-LAMINATED-GLASS SCHEDULE

A. Glass Type GL-5: Low-E-coated, tinted, insulating laminated glass.

1. Basis-of-Design Product: PPG Industries, Inc.; OPTIGRAY + SUNGATE 400.
2. Overall Unit Thickness: 1 inch.
3. Minimum Thickness of Outdoor Lite: 0.125 inches.
4. Outdoor Lite: Tinted fully tempered float glass.
5. Tint Color: Gray.
6. Interspace Content: Argon.
7. Indoor Lite: Clear laminated glass with two plies of fully tempered float glass.
 - a. Minimum Thickness of Each Glass Ply: 0.125 inches.
 - b. Interlayer Thickness: 0.030 inch.
8. Low-E Coating: Pyrolytic on second surface.
9. Winter Nighttime U-Factor: U-0.45 maximum.
10. Summer Daytime U-Factor: U-0.45 maximum.
11. Safety glazing required.

END OF SECTION 088000

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SECTION 089119 - FIXED LOUVERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes fixed, extruded-aluminum louvers.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.
- B. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing.

1.3 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Based on tests performed according to AMCA 500-L.
- B. Windborne-debris-impact-resistance test reports.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Louvers shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver-blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures shall be considered to act normal to the face of the building.
 - 1. Wind Loads: Determine loads based on pressures as indicated on Drawings.
- B. Louver Performance Ratings: Provide louvers complying with requirements specified, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.

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2.2 FIXED, EXTRUDED-ALUMINUM LOUVERS

A. Horizontal, Drainable-Blade Louver:

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. Greenheck Fan Corporation.
 - b. American Warming & Ventilating Company.
2. Louver Depth: 4 inches.
3. Frame and Blade Material and Nominal Thickness: Not less than 0.080 inch for frames and 0.080 inch for blades.
4. Mullion Type: Exposed.
5. Louver Performance Ratings: See Mechanical Drawings.
6. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

2.3 LOUVER SCREENS

A. General: Provide screen at each exterior louver.

1. Screen Location for Fixed Louvers: Interior face.
2. Screening Type: Bird screening.

B. Louver Screen Frames: Same type and form of metal as indicated for louver to which screens are attached.

C. Louver Screening for Aluminum Louvers:

1. Bird Screening: Aluminum, 1/2-inch- square mesh, 0.063-inch wire.

2.4 MATERIALS

A. Aluminum Extrusions: ASTM B221 (ASTM B221M), alloy 6063-T5, T-52, or T6.

B. Fasteners: Use types and sizes to suit unit installation conditions.

1. Use Phillips flat-head screws for exposed fasteners unless otherwise indicated.
2. For fastening aluminum, use aluminum or 300 series stainless-steel fasteners.
3. For color-finished louvers, use fasteners with heads that match color of louvers.

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2.5 FABRICATION

- A. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.
- B. Join frame members to each other and to fixed louver blades with fillet welds concealed from view unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

2.6 ALUMINUM FINISHES

- A. High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 1. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Locate and place louvers level, plumb, and at indicated alignment with adjacent work.
- B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
- C. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.
- D. Protect unpainted galvanized and nonferrous-metal surfaces that are in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.

3.2 ADJUSTING

- A. Restore louvers damaged during installation and construction so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.

END OF SECTION 089119

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SECTION 092216 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Non-load-bearing steel framing systems for interior partitions.
2. Suspension systems for interior ceilings and soffits.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Evaluation reports for firestop tracks.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- ##### A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 119 by an independent testing agency.

2.2 FRAMING SYSTEMS

A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.

1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
2. Protective Coating: ASTM A 653/A 653M, G40, hot-dip galvanized unless otherwise indicated.

B. Studs and Runners: ASTM C 645.

1. Steel Studs and Runners:

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- 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) MBA Building Supplies.
 - 2) MRI Steel Framing, LLC.
 - 3) Steel Network, Inc. (The).
 - b. Minimum Base-Metal Thickness: As indicated on Drawings.
 - c. Depth: As indicated on Drawings.
- C. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.
- 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. CEMCO; California Expanded Metal Products Co.
 - b. ClarkDietrich Building Systems.
 - c. Steel Network, Inc. (The).
- D. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width 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. ClarkDietrich Building Systems.
 - b. MRI Steel Framing, LLC.
 - 2. Minimum Base-Metal Thickness: 0.0269 inch.
- E. Cold-Rolled Channel Bridging: Steel, 0.0538-inch minimum base-metal thickness, with minimum 1/2-inch-wide flanges.
- 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. ClarkDietrich Building Systems.
 - b. MRI Steel Framing, LLC.
 - 2. Depth: 1-1/2 inches.
 - 3. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch-thick, galvanized steel.

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F. Hat-Shaped, Rigid Furring Channels: ASTM C 645.

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. ClarkDietrich Building Systems.
 - b. MRI Steel Framing, LLC.
2. Minimum Base-Metal Thickness: As indicated on Drawings.
3. Depth: As indicated on Drawings.

2.3 SUSPENSION SYSTEMS

- A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch-diameter wire, or double strand of 0.048-inch-diameter wire.
- B. Hanger Attachments to Concrete:
1. Expansion Anchors: Fabricated from corrosion-resistant materials, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing per ASTM E 488/E 488M conducted by a qualified testing agency.
 2. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with allowable load capacities calculated according to ICC-ES AC70, greater than or equal to the design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.
- C. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch in diameter.
- D. Flat Hangers: Steel sheet, 1 by 3/16 inch by length indicated.
- E. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.0538 inch and minimum 1/2-inch-wide flanges.
1. Depth: 2-1/2 inches.
- F. Furring Channels (Furring Members):
1. Cold-Rolled Channels: 0.0538-inch uncoated-steel thickness, with minimum 1/2-inch-wide flanges, 3/4 inch deep.
 2. Steel Studs and Runners: ASTM C 645.
 - a. Minimum Base-Metal Thickness: As indicated on Drawings.
 - b. Depth: As indicated on Drawings.
 3. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch deep.

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- a. Minimum Base-Metal Thickness: As indicated on Drawings.

2.4 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
 - 1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
- B. Isolation Strip at Exterior Walls: Provide the following:
 - 1. Asphalt-Saturated Organic Felt: ASTM D 226/D 226M, Type I (No. 15 asphalt felt), nonperforated.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C 754.
 - 1. Gypsum Plaster Assemblies: Also comply with requirements in ASTM C 841 that apply to framing installation.
 - 2. Portland Cement Plaster Assemblies: Also comply with requirements in ASTM C 1063 that apply to framing installation.
 - 3. Gypsum Veneer Plaster Assemblies: Also comply with requirements in ASTM C 844 that apply to framing installation.
 - 4. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.
- B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.
- C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- D. Install bracing at terminations in assemblies.
- E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.2 INSTALLING FRAMED ASSEMBLIES

- A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

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- B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- C. Install studs so flanges within framing system point in same direction.
- D. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.
 - 1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
 - 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
 - a. Install two studs at each jamb unless otherwise indicated.
 - b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
 - c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
 - 3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
 - 4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
 - a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.
 - 5. Curved Partitions:
 - a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
 - b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs 6 inches o.c.
- E. Direct Furring:
 - 1. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.

3.3 INSTALLING SUSPENSION SYSTEMS

- A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

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- B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
- C. Suspend hangers from building structure as follows:
 - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
 - a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 - 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
 - a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
 - 3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 - 4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 - 5. Do not attach hangers to steel roof deck.
 - 6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
 - 7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
 - 8. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.
- E. Seismic Bracing: Sway-brace suspension systems with hangers used for support.
- F. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 092216

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SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior gypsum board.
2. Exterior gypsum board for ceilings and soffits.
3. Tile backing panels.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- ##### A. Fire-Resistance-Rated Assemblies:
- For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

2.2 GYPSUM BOARD, GENERAL

- ##### A. Size:
- Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

A. Gypsum Board, Type X: ASTM C 1396/C 1396M.

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. American Gypsum.
 - b. CertainTeed Corporation.
 - c. Georgia-Pacific Building Products.
 - d. United States Gypsum Company.

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2. Thickness: 5/8 inch.
 3. Long Edges: Tapered and featured (rounded or beveled) for prefilling.
- B. Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.
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. American Gypsum.
 - b. CertainTeed Corporation.
 - c. Georgia-Pacific Building Products.
 - d. United States Gypsum Company.
 2. Core: 5/8 inch, Type X.
 3. Long Edges: Tapered.
 4. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.4 EXTERIOR GYPSUM BOARD FOR CEILINGS AND SOFFITS

- A. Exterior Gypsum Soffit Board: ASTM C 1396/C 1396M, with manufacturer's standard edges.
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. American Gypsum.
 - b. CertainTeed Corporation.
 - c. Georgia-Pacific Building Products.
 - d. United States Gypsum Company.
 2. Core: 5/8 inch, Type X.
- B. Glass-Mat Gypsum Sheathing Board: ASTM C 1177/C 1177M, with fiberglass mat laminated to both sides and with manufacturer's standard edges.
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. American Gypsum.
 - b. CertainTeed Corporation.
 - c. Georgia-Pacific Building Products.
 - d. United States Gypsum Company.

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2. Core: 5/8 inch, Type X.

2.5 TILE BACKING PANELS

- A. Cementitious Backer Units: ANSI A118.9 and ASTM C 1288 or ASTM C 1325, with manufacturer's standard edges.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. CertainTeed Corporation.
 - b. National Gypsum Company.
 - c. United States Gypsum Company.
 2. Thickness: 1/2 inch.
 3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.6 TRIM ACCESSORIES

- A. Interior Trim: ASTM C 1047.
 1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet.
 2. Shapes:
 - a. Cornerbead.
 - b. Bullnose bead.
 - c. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - d. L-Bead: L-shaped; exposed long flange receives joint compound.
 - e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
 - f. Expansion (control) joint.
- B. Exterior Trim: ASTM C 1047.
 1. Material: Hot-dip galvanized-steel sheet, plastic, or rolled zinc.
 2. Shapes:
 - a. Cornerbead.
 - b. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - c. Expansion (Control) Joint: One-piece, rolled zinc with V-shaped slot and removable strip covering slot opening.

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2.7 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:
 - 1. Interior Gypsum Board: Paper.
 - 2. Exterior Gypsum Soffit Board: Paper.
 - 3. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
 - 4. Tile Backing Panels: As recommended by panel manufacturer.
- C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.
 - 1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
 - 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.
 - 3. Fill Coat: For second coat, use setting-type, sandable topping compound.
 - 4. Finish Coat: For third coat, use setting-type, sandable topping compound.
 - 5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound.
- D. Joint Compound for Exterior Applications:
 - 1. Exterior Gypsum Soffit Board: Use setting-type taping compound and setting-type, sandable topping compound.
 - 2. Glass-Mat Gypsum Sheathing Board: As recommended by sheathing board manufacturer.
- E. Joint Compound for Tile Backing Panels:
 - 1. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.
 - 2. Cementitious Backer Units: As recommended by backer unit manufacturer.

2.8 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.
- B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
- C. Steel Drill Screws: ASTM C 1002 unless otherwise indicated.
 - 1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.

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2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
- D. Acoustical Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
 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. Hilti, Inc.
 - b. Pecora Corporation.
 - c. United States Gypsum Company.
- E. Thermal Insulation: As specified in Section 072100 "Thermal Insulation."
- F. Vapor Retarder: As specified in Section 072600 "Vapor Retarders."

PART 3 - EXECUTION

3.1 APPLYING AND FINISHING PANELS

- A. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- B. Comply with ASTM C 840.
- C. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch- wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- D. For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- E. Prefill open joints and damaged surface areas.
- F. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- G. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
 2. Level 2: Panels that are substrate for tile.

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3. Level 3: Where indicated on Drawings.
4. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.
 - a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."
5. Level 5: Where indicated on Drawings.
 - a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."
- H. Glass-Mat Gypsum Sheathing Board: Finish according to manufacturer's written instructions for use as exposed soffit board.
- I. Glass-Mat Faced Panels: Finish according to manufacturer's written instructions.
- J. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.2 PROTECTION

- A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- B. Remove and replace panels that are wet, moisture damaged, and mold damaged.

END OF SECTION 092900

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SECTION 093013 - CERAMIC TILING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Ceramic wall tile.
2. Tile backing panels.
3. Metal edge strips.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples:

1. Each type and composition of tile and for each color and finish required. For ceramic mosaic tile in color blend patterns, provide samples of each color blend.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.

1.5 QUALITY ASSURANCE

A. Installer Qualifications:

1. Installer is a five-star member of the National Tile Contractors Association or a Trowel of Excellence member of the Tile Contractors' Association of America.
2. Installer's supervisor for Project holds the International Masonry Institute's Foreman Certification.

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3. Installer employs Ceramic Tile Education Foundation Certified Installers or installers recognized by the U.S. Department of Labor as Journeyman Tile Layers.
- B. 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 floor tile installation.
 2. Build mockup of wall tile installation.
 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide Standard-grade tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.

2.2 TILE PRODUCTS

- A. As indicated on Drawing Finish Notes, Schedule and Legend.

2.3 TILE BACKING PANELS

- A. Cementitious Backer Units: ANSI A118.9 or ASTM C 1325, Type A.
 1. Thickness: 5/8 inch.

2.4 SETTING MATERIALS

- A. Portland Cement Mortar (Thickset) Installation Materials: ANSI A108.02.
- B. Standard Dry-Set Mortar (Thinset): ANSI A118.1.
 1. For wall applications, provide non-sagging mortar.

2.5 GROUT MATERIALS

- A. Water-Cleanable Epoxy Grout: ANSI A118.3.

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- B. Grout for PregROUTED Tile Sheets: Same product used in factory to pregROUT tile sheets.

2.6 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- B. Metal Edge Strips: As indicated on Drawing Finish Schedule, Legend and Notes.
- C. Floor Sealer: Manufacturer's standard product for sealing grout joints and that does not change color or appearance of grout.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - 1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
 - 2. Verify that concrete substrates for tile floors installed with thinset mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thinset mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
- B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot toward drains.
- C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

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3.3 CERAMIC TILE INSTALLATION

- A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
- B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.
- E. Where accent tile differs in thickness from field tile, vary setting bed thickness so that tiles are flush.
- F. Jointing Pattern: Lay tile in pattern shown on drawings. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.
- G. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
 - 1. Ceramic Wall Tile: 1/8 inch.
- H. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.
- I. Metal Edge Strips: Install at locations indicated.
- J. Install tile backing panels and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated. Use modified dry-set mortar for bonding material unless otherwise directed in manufacturer's written instructions.

END OF SECTION 093013

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SECTION 095113 - ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes acoustical panels and exposed suspension systems for interior ceilings.

1.2 PREINSTALLATION MEETINGS

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

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, and coordinated with each other, using input from installers of the items involved.
- B. Product test reports.
- C. Research reports.
- D. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: Class A according to ASTM E 1264.

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2. Smoke-Developed Index: 450 or less.

2.2 ACOUSTICAL PANELS

- A. Basis-of-Design Manufacturer: USG Mars Clima Plus SLT 24"x24".
- B. Alternate Manufacturers:
 1. Armstrong Ceilings.
 2. Certainteed.

2.3 METAL SUSPENSION SYSTEM

- A. Basis-of-Design Manufacturer: USG DX/DXL 15/16" Suspension Grid.
- B. Alternate Manufacturers:
 1. Armstrong Ceilings.
 2. Certainteed.

2.4 ACCESSORIES

- A. Attachment Devices: Size for five times the design load indicated in ASTM C 635/C 635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
- B. Hold-Down Clips: Manufacturer's standard hold-down.
- C. Impact Clips: Manufacturer's standard impact-clip system designed to absorb impact forces against acoustical panels.

2.5 METAL EDGE MOLDINGS AND TRIM

- A. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders unless otherwise indicated.

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- B. Layout openings for penetrations centered on the penetrating items.

3.2 INSTALLATION

- A. Install acoustical panel ceilings according to ASTM C 636/C 636M and manufacturer's written instructions.
- B. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
 - 1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
 - 2. Do not use exposed fasteners, including pop rivets, on moldings and trim.
 - 3. Arrange directionally patterned acoustical panels as follows:
 - a. As indicated on reflected ceiling plans.
 - 4. Install hold-down impact clips in areas indicated; space according to panel manufacturer's written instructions unless otherwise indicated.

END OF SECTION 095113

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SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Resilient base.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified, not less than 12 inches long.

PART 2 - PRODUCTS

2.1 VINYL BASE

A. Basis-of-Design Product: Flexco Rubber Flooring Rubber Base

1. Height: 4”.
2. Base type: Coved.
3. Color: #078 Umber.

B. Alternate Manufacturer:

1. Allstate.
2. Johnsonite.

2.2 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

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PART 3 - EXECUTION

3.1 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Do not install resilient products until they are the same temperature as the space where they are to be installed.
- C. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.2 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- G. Preformed Corners: Install preformed corners before installing straight pieces.

3.3 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.
- B. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 096513

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SECTION 096519 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Vinyl composition floor tile.
 - 2. Electrostatic-dissipative floor tile.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
 - 1. Show details of special patterns.
- C. Samples: Full-size units of each color and pattern of floor tile required.

1.3 CLOSEOUT SUBMITTALS

- A. Maintenance data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For resilient tile flooring, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

2.2 VINYL COMPOSITION FLOOR TILE

- A. Basis-of-Design Product: Armstrong Imperial Texture Standard Excelon Vinyl Composition Tile.
 - 1. Color No.: 51927 Field Grey.
 - 2. Size: 12"x12".
- B. Alternate Manufacturers:

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1. Mannington.
2. Flexco.

2.3 ELECTROSTATIC DISSIPATIVE FLOOR TILE

- A. Basis-of-Design Product: Flexco Delane Electrostatic Dissipative Vinyl Composition Tile.
 1. Color No.: 40 White/Gray.
 2. Size: 12"x12".
- B. Alternate Manufacturers:
 1. Mannington EDVC Tile.
 2. Armstrong Excelon EDVC Tile.

2.4 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.
- C. Floor Polish: Provide protective, liquid floor-polish products recommended by floor tile manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.
 3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
 4. Moisture Testing: Proceed with installation only after substrates pass testing according to floor tile manufacturer's written recommendations, but not less stringent than the following:

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- a. Perform anhydrous calcium chloride test according to ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
 - b. Perform relative humidity test using in situ probes according to ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install floor tiles until they are the same temperature as the space where they are to be installed.
- E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

3.2 FLOOR TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
- 1. Lay tiles square with room axis.
- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
- 1. Lay tiles with grain direction alternating in adjacent tiles (basket-weave pattern).
- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.
- G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.

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- H. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.3 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.
- B. Floor Polish: Remove soil, adhesive, and blemishes from floor tile surfaces before applying liquid floor polish.
 - 1. Apply one coat(s).
- C. Cover floor tile until Substantial Completion.

END OF SECTION 096519

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SECTION 096623 - RESINOUS MATRIX TERRAZZO FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes thin-set, epoxy-resin terrazzo flooring and base.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include terrazzo installation requirements. Include plans, elevations, sections, component details, and attachments to other work.
- C. Samples: For each exposed product and for each color and texture specified.

1.3 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an installer who is a contractor member of NTMA.
- B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1.5 FIELD CONDITIONS

- A. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting terrazzo installation.
- B. Control and collect water and dust produced by grinding operations. Protect adjacent construction from detrimental effects of grinding operations.

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PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. NTMA Standards: Comply with NTMA's "Terrazzo Specifications and Design Guide" and with written recommendations for terrazzo type indicated unless more stringent requirements are specified.

2.2 EPOXY-RESIN TERRAZZO

- A. Epoxy-Resin Terrazzo as indicated on A1.40 Finish Schedule, Notes & Legend: Comply with NTMA's "Terrazzo Specifications and Design Guide" and manufacturer's written instructions for matrix and aggregate proportions and mixing. Approved manufacturers include Terrazzo Epoxy Resin Matrix by Doyle Dickerson Terrazzo, Inc. and Concord Terrazzo Company, Inc.

- 1. Thickness: 3/8 inch nominal.

- B. Materials:

- 1. Flexible Reinforcing Membrane: Manufacturer's resinous membrane with fiberglass scrim for substrate-crack preparation and reflective-crack reduction.
- 2. Primer: Manufacturer's product recommended for substrate and use indicated.
- 3. Epoxy-Resin Matrix: Manufacturer's standard recommended for use indicated and in color required for mix indicated.

- a. Physical Properties without Aggregates:

- 1) Hardness: 60 to 85 per ASTM D 2240, Shore D.
- 2) Minimum Tensile Strength: 3000 psi per ASTM D 638 for a 2-inch specimen made using a "C" die per ASTM D 412.
- 3) Minimum Compressive Strength: 10,000 psi per ASTM D 695, Specimen B cylinder.
- 4) Chemical Resistance: No deleterious effects by contaminants listed below after seven-day immersion at room temperature per ASTM D 1308.
 - a) Distilled water.
 - b) Mineral water.
 - c) Isopropanol.
 - d) Ethanol.
 - e) 0.025 percent detergent solution.
 - f) 1.0 percent soap solution.
 - g) 10 percent sodium hydroxide.
 - h) 10 percent hydrochloric acid.
 - i) 30 percent sulfuric acid.
 - j) 5 percent acetic acid.

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- b. Physical Properties with Aggregates: For resin blended with Georgia white marble, ground, grouted, and cured per requirements in NTMA's "Terrazzo Specifications and Design Guide"; comply with the following:
 - 1) Flammability: Self-extinguishing, maximum extent of burning 1/4 inch per ASTM D 635.
 - 2) Thermal Coefficient of Linear Expansion: 0.0025 inch/inch per deg F for temperature range of minus 12 to plus 140 deg F per ASTM D 696.
- 4. Aggregates: Comply with NTMA gradation standards for mix indicated and contain no deleterious or foreign matter.
 - a. Abrasion and Impact Resistance: Less than 40 percent loss per ASTM C 131.
 - b. 24-Hour Absorption Rate: Less than 0.75 percent.
 - c. Dust Content: Less than 1.0 percent by weight.
- 5. Finishing Grout: Resin based.

2.3 STRIP MATERIALS

- A. Thin-Set Divider Strips: L-type angle, 1/4 inch deep.
 - 1. Material: Aluminum.
 - 2. Top Width: 1/8 inch.
- B. Heavy-Top Divider Strips: L-type angle in depth required for topping thickness indicated.
 - 1. Bottom-Section Material: Galvanized steel.
 - 2. Top-Section Material: Aluminum.
 - 3. Top-Section Width: 1/8 inch.
- C. Control-Joint Strips: Separate, double L-type angles, positioned back to back, that match material and color of divider strips and in depth required for topping thickness indicated.
- D. Accessory Strips: Match divider-strip width, material, and color unless otherwise indicated. Use the following types of accessory strips as required to provide a complete installation:
 - 1. Base-bead strips for exposed top edge of terrazzo base.
 - 2. Edge-bead strips for exposed edges of terrazzo.
 - 3. Nosings for terrazzo stair treads and landings.
- E. Abrasive Strips: Three-line Abrasive nosing strip and two-line abrasive inserts at nosings. Silicon carbide or aluminum oxide, or combination of both, in epoxy-resin binder and set in channel.
 - 1. Width: 1/2 inch.
 - 2. Depth: As required by terrazzo thickness.
 - 3. Length: 4 inches less than stair width.
 - 4. Color: As selected by Architect from full range of industry colors.

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2.4 MISCELLANEOUS ACCESSORIES

- A. Strip Adhesive: Epoxy-resin adhesive recommended by adhesive manufacturer for this use.
- B. Strip Anchoring Devices: Provide mechanical anchoring devices or adhesives for strip materials as recommended by manufacturer and required for secure attachment to substrate.
- C. Patching and Fill Material: Terrazzo manufacturer's resinous product approved and recommended by manufacturer for application indicated.
- D. Joint Compound: Terrazzo manufacturer's resinous product approved and recommended by manufacturer for application indicated.
- E. Resinous Matrix Terrazzo Cleaner: Chemically neutral cleaner with pH factor between 7 and 10 that is biodegradable, phosphate free, and recommended by sealer manufacturer for use on terrazzo type indicated.
- F. Sealer: Slip- and stain-resistant, penetrating-type sealer that is chemically neutral; does not affect terrazzo color or physical properties; is recommended by sealer manufacturer; and complies with NTMA's "Terrazzo Specifications and Design Guide" for terrazzo type indicated.
 - 1. Surface Friction: Not less than 0.6 according to ASTM D 2047.
 - 2. Acid-Base Properties: With pH factor between 7 and 10.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean substrates of substances, including oil, grease, and curing compounds, that might impair terrazzo bond. Provide clean, dry, and neutral substrate for terrazzo application.
- B. Concrete Slabs:
 - 1. Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with terrazzo.
 - a. Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.
 - b. Repair damaged and deteriorated concrete according to terrazzo manufacturer's written recommendations. Install flexible reinforcing membrane at substrate cracks in areas to receive terrazzo.
 - c. Use patching and fill material to fill holes and depressions in substrates according to terrazzo manufacturer's written instructions.

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- C. Verify that concrete substrates are dry and moisture-vapor emissions are within acceptable levels according to manufacturer's written instructions.
 - 1. Moisture Testing: Test for moisture content by method recommended in writing by terrazzo manufacturer. Proceed with installation only after substrates pass testing.

3.2 EPOXY-RESIN TERRAZZO INSTALLATION

- A. Comply with NTMA's written recommendations for terrazzo and accessory installation.
- B. Place according to manufacturer's written instructions and NTMA's "Terrazzo Specifications and Design Guide."
- C. Installation Tolerance: Limit variation in terrazzo surface from level to 1/4 inch in 10 feet; noncumulative.
- D. Primer: Apply to terrazzo substrates according to manufacturer's written instructions.
- E. Strip Materials:
 - 1. Divider and Control-Joint Strips:
 - a. Locate divider strips in locations indicated.
 - b. Install control-joint strips back to back directly above concrete-slab control joints.
 - c. Install control-joint strips with 1/4-inch gap between strips, and install sealant in gap.
 - d. Install strips in adhesive setting bed without voids below strips, or mechanically anchor strips as required to attach strips to substrate, as recommended by strip manufacturer.
 - 2. Accessory Strips: Install as required to provide a complete installation.
 - 3. Abrasive Strips: Install with surface of abrasive strip positioned 1/16 inch higher than terrazzo surface.
- F. Fine Grinding: Grind with stones 120 grit or finer until all grout is removed from surface. Repeat rough grinding, grout coat, and fine grinding if large voids exist after initial fine grinding. Produce surface with a minimum of 70 percent aggregate exposure.
 - 1. Sheen Level / Finish Options.
 - a. Level 4: Gloss Shine: 3,000 grit.
- G. Repair: Cut out and replace terrazzo areas that evidence lack of bond with substrate. Cut out terrazzo areas in panels defined by strips and replace to match adjacent terrazzo, or repair panels according to NTMA's written recommendations, as approved by Architect.

3.3 CLEANING AND PROTECTION

- A. Cleaning:

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1. Remove grinding dust from installation and adjacent areas.
 2. Wash surfaces with cleaner according to NTMA's written recommendations and manufacturer's written instructions; rinse surfaces with water and allow them to dry thoroughly.
- B. Sealing:
1. Seal surfaces according to NTMA's written recommendations.
 2. Apply sealer according to sealer manufacturer's written instructions.
- C. Protection: Provide final protection and maintain conditions, in a manner acceptable to Installer, that ensure that terrazzo is without damage or deterioration at time of Substantial Completion.

END OF SECTION 096623

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SECTION 096813 - TILE CARPETING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes modular carpet tile.

1.2 PREINSTALLATION MEETINGS

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

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For carpet tile installation, plans showing the following:
 - 1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
 - 2. Carpet tile type, color, and dye lot.
 - 3. Type of subfloor.
 - 4. Type of installation.
 - 5. Pattern of installation.
 - 6. Pattern type, location, and direction.
 - 7. Pile direction.
 - 8. Type, color, and location of insets and borders.
 - 9. Type, color, and location of edge, transition, and other accessory strips.
 - 10. Transition details to other flooring materials.
- C. Samples: For each exposed product and for each color and texture required.

1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Sample warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.

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1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Certified by the International Certified Floorcovering Installers Association at the Commercial II certification level.

1.7 WARRANTY

- A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.

- 1. Warranty Period: Not Applicable

PART 2 - PRODUCTS

2.1 CARPET TILE

- A. Basis-of-Design Product: Shaw Contract
 - 1. Style: Construct Tile 5T104
 - 2. Color: Emblem 03753
 - 3. Size: 24"x24".
 - 4. Installation: Quarter turned.

2.2 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.
- B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that comply with flammability requirements for installed carpet tile, and are recommended by carpet tile manufacturer for releasable installation.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Concrete Slabs:
 - 1. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.

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- a. Anhydrous Calcium Chloride Test: ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
 - b. Relative Humidity Test: Using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
 - c. Perform additional moisture tests recommended in writing by adhesive and carpet tile manufacturers. Proceed with installation only after substrates pass testing.
- B. Wood Subfloors: Verify that underlayment surface is free of irregularities and substances that may interfere with adhesive bond or show through surface.
- C. Metal Subfloors: Verify that underlayment surface is free of irregularities and substances that may interfere with adhesive bond or show through surface.
- D. Painted Subfloors: Perform bond test recommended in writing by adhesive manufacturer.
1. Access Flooring Systems: Verify access floor substrate is compatible with carpet tile and adhesive, if any, and underlayment surface is gaps greater than 1/8 inch and protrusions more than 1/32 inch.

3.2 PREPARATION

- A. General: Comply with CRI's "CRI Carpet Installation Standards" and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch wide or wider, and protrusions more than 1/32 inch unless more stringent requirements are required by manufacturer's written instructions.
- C. Concrete Substrates: Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by adhesive and carpet tile manufacturers.
- D. Metal Substrates: Clean grease, oil, soil and rust, and prime if recommended in writing by adhesive manufacturer. Rough sand painted metal surfaces and remove loose paint. Sand aluminum surfaces, to remove metal oxides, immediately before applying adhesive.
- E. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

- A. General: Comply with CRI's "CRI Carpet Installation Standard," Section 18, "Modular Carpet" and with carpet tile manufacturer's written installation instructions.

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- B. Installation Method: As recommended in writing by carpet tile manufacturer.
- C. Maintain dye-lot integrity. Do not mix dye lots in same area.
- D. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- E. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet tile as marked on subfloor. Use nonpermanent, nonstaining marking device.
- G. Install pattern parallel to walls and borders.
- H. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 096813

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SECTION 099113 - EXTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and the application of paint systems on the following exterior substrates:
 - 1. Steel.

1.2 DEFINITIONS

- A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- D. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- E. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- F. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
 - 1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.

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:

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1. Benjamin Moore & Co.
2. PPG Architectural Coatings.
3. Sherwin-Williams Company (The).

- B. Products: Subject to compliance with requirements, provide one of the products listed in the Exterior Painting Schedule for the paint category indicated.

2.2 PAINT, GENERAL

- A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."
- B. Material Compatibility:
1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

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. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- C. Proceed with coating application only after unsatisfactory conditions have been corrected.
1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.

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3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual."
- B. 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 CLEANING AND PROTECTION

- A. 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.
- B. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.5 EXTERIOR PAINTING SCHEDULE

A. Steel Substrates:

1. Water-Based Light Industrial Coating System:

- a. Prime Coat: Primer, alkyd, anti-corrosive for metal.
 - 1) Benjamin Moore: Super Spec HP Alkyd Metal Primer, P06/KP06.
 - 2) PPG: Speedhide Interior/Exterior Rush Inhibitive Steel Primer, 6-212
 - 3) Sherwin-Williams: Kem Kromik Universal Metal Primer, B50NZ1
- b. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
- c. Topcoat: Light industrial coating, exterior, water based, Gloss
 - 1) Benjamin Moore: Ultra Spec HP DTM 100% Acrylic Latex Gloss, HP28/FP28.
 - 2) PPG: Pitt-Tech Plus Int./Ext. High Gloss DTM Industrial Enamel, 90-1310.
 - 3) Sherwin-Williams: Pro Industrial Acrylic Gloss Coating, B66W006611.

END OF SECTION 099113

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SECTION 099123 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and the application of paint systems on the following interior substrates:
 - 1. Concrete.
 - 2. Concrete masonry units (CMUs).
 - 3. Steel.
 - 4. Exposed interior steel columns.
 - 5. Gypsum board.

1.2 DEFINITIONS

- A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. MPI Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- D. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- E. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- F. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- G. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
 - 1. Include Printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
- B. Samples: For each type of paint system and in each color and gloss of topcoat.

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1.4 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.
 - 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.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide one of the products listed in the Interior Painting Schedule for the paint category indicated.
- B. Basis-of-Design Manufacturer all paints including exposed interior steel columns: Sherwin-Williams.
 - 1. Alternate Manufacturers.
 - a. Benjamin Moore & Co.
 - b. PPG Architectural Finishes, Inc.

2.2 PAINT, GENERAL

- A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."
- B. Material Compatibility:
 - 1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
- C. Colors: As selected by Architect from manufacturer's full range.

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PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Concrete and Masonry (CMU): 12 percent.
 - 2. Gypsum Board: 12 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 Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
- B. 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 INTERIOR PAINTING SCHEDULE

- A. Concrete and CMU Substrates:
 - 1. Acrylic Finish: Two finish coats over a primer/
 - a. Primer: Interior concrete and masonry primer.

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- 1) Sherwin-Williams, Loxon Concrete & Masonry Primer, A24W8300.
- b. Finish Coats: Interior low-luster acrylic enamel. Finish as scheduled.
 - 1) Flat (Gloss Level 1).
 - a) Sherwin-Williams, ProMar 200 Zero VOC Interior Flat, B30W2600 Series.
 - 2) Egg-Shell (Gloss Level 3).
 - a) Sherwin-Williams, ProMar200 Zero VOC Interior Latex Egg-Shell, B20W4026 Series.
 - 3) Semi-Gloss (Gloss Level 5).
 - a) Sherwin-Williams, ProMar 200 Zero VOC Interior Latex Semi-Gloss, B34W2600 Series.

B. Steel Substrates and Exposed Interior Steel Columns.

- 1. Alkyd System. Anticorrosive.
 - a. Prime Coat: Quick-drying alkyd metal primer.
 - 1) Sherwin-Williams, Industrial & marine, Ken Kromik Universal Alkyd Primer, B50NZ6.
 - b. Intermediate Coat: Interior alkyd matching topcoat.
 - 1) Sherwin-Williams, ProMar 200, Alkyd Semi-Gloss, B34W251.
 - c. Topcoat: Interior (finish as scheduled.)
 - 1) Sherwin-Williams, ProMar 200, Alkyd Semi-Gloss, B34W251.

C. Gypsum Board Substrates.

- 1. Latex System.
 - a. Prime Coat: Interior latex primer/sealer.
 - 1) Sherwin-Williams, ProMar 200 Interior Latex Primer B28W08200.
 - b. Intermediate Coat: Interior latex matching topcoat.
 - 1) Flat (Gloss Level 1).
 - a) Sherwin-Williams, ProMar 200 Zero VOC Interior Flat, B30W2600 Series.
 - 2) Egg-Shell (Gloss Level 3).
 - a) Sherwin-Williams, ProMar200 Zero VOC Interior Latex Egg-Shell, B20W4026 Series.
 - 3) Semi-Gloss (Gloss Level 5).
 - a) Sherwin-Williams, ProMar 200 Zero VOC Interior Latex Semi-Gloss, B34W2600 Series.
 - c. Topcoat: Interior latex (finish as scheduled).
 - 1) Flat (Gloss Level 1).
 - a) Sherwin-Williams, ProMar 200 Zero VOC Interior Flat, B30W2600 Series.
 - 2) Egg-Shell (Gloss Level 3).
 - a) Sherwin-Williams, ProMar200 Zero VOC Interior Latex Egg-Shell, B20W4026 Series.
 - 3) Semi-Gloss (Gloss Level 5).
 - a) Sherwin-Williams, ProMar 200 Zero VOC Interior Latex Semi-Gloss, B34W2600 Series.

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SECTION 102113.19 - PLASTIC TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes solid-plastic toilet compartments configured as toilet enclosures and urinal screens.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For toilet compartments. Include plans, elevations, sections, details, and attachment details.

1.3 INFORMATIONAL SUBMITTALS

- A. Product certificates.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 25 or less.
 - 2. Smoke-Developed Index: 450 or less.
- B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1 for toilet compartments designated as accessible.

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2.2 SOLID-PLASTIC TOILET COMPARTMENTS

- 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. Global Partitions; ASI Group.
 - 2. Scranton Products.
- B. Toilet-Enclosure Style: Overhead braced Floor anchored.
- C. Entrance-Screen Style: Overhead braced Floor anchored.
- D. Urinal-Screen Style: Wall hung.
- E. Door, Panel, Screen, and Pilaster Construction: Solid, high-density polyethylene (HDPE) panel material, not less than 1 inch thick, seamless, with eased edges, and with homogenous color and pattern throughout thickness of material.
 - 1. Integral Hinges: Configure doors and pilasters to receive integral hinges.
 - 2. Heat-Sink Strip: Manufacturer's standard continuous, extruded-aluminum strip fastened to exposed bottom edges of solid-plastic components to hinder malicious combustion.
 - 3. Color and Pattern: One color and pattern in each room as selected by Architect from manufacturer's full range.
- F. Pilaster Shoes and Sleeves (Caps): Manufacturer's standard design; stainless steel.
- G. Brackets (Fittings):
 - 1. Stirrup Type: Ear or U-brackets, clear-anodized aluminum.
 - 2. Full-Height (Continuous) Type: Manufacturer's standard design; extruded aluminum.

2.3 HARDWARE AND ACCESSORIES

- A. Hardware and Accessories: Manufacturer's heavy-duty stainless-steel operating hardware and accessories.
 - 1. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.
- B. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish.
- C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless-steel, hot-dip galvanized-steel, or other rust-resistant, protective-coated steel compatible with related materials.

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2.4 FABRICATION

- A. Fabrication, General: Fabricate toilet compartment components to sizes indicated. Coordinate requirements and provide cutouts for through-partition toilet accessories where required for attachment of toilet accessories.
- B. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.
- C. Floor-Anchored Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at pilasters for structural connection to floor. Provide shoes at pilasters to conceal anchorage.
- D. Door Size and Swings: Unless otherwise indicated, provide 24-inch-wide, in-swinging doors for standard toilet compartments and 36-inch-wide, out-swinging doors with a minimum 32-inch-wide, clear opening for compartments designated as accessible.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
 - 1. Maximum Clearances:
 - a. Pilasters and Panels: 1/2 inch.
 - b. Panels and Walls: 1 inch.
 - 2. Full-Height (Continuous) Brackets: Secure panels to walls and to pilasters with full-height brackets.
 - a. Locate bracket fasteners so holes for wall anchors occur in masonry or tile joints.
 - b. Align brackets at pilasters with brackets at walls.

3.2 ADJUSTING

- A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

END OF SECTION 102113.19

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SECTION 102800 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Public and Private-use washroom accessories.
2. Under-lavatory guards.
3. Custodial accessories.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Sample warranty.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 WARRANTY

A. Manufacturer's Special Warranty for Mirrors: Manufacturer agrees to repair or replace mirrors that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

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2.2 PUBLIC AND PRIVATE-USE WASHROOM ACCESSORIES

A. Toilet Tissue (Roll) Dispenser (TP):

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. American Specialties, Inc.
 - b. Bobrick Washroom Equipment, Inc.
 - c. Bradley Corporation.
2. Description: Roll-in-reserve dispenser cabinet with hinged front secured with tumbler lockset.
3. Mounting: Surface mounted.
4. Operation: Non-control delivery with theft-resistant spindle.
5. Capacity: Designed for 4-1/2- or 5-inch- diameter tissue rolls.
6. Material and Finish: Stainless steel, No. 4 finish (satin).

B. Paper Towel (Folded) Dispenser (PT):

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. American Specialties, Inc. Model #9452 (basis of design)
 - b. Bobrick Washroom Equipment, Inc.
 - c. Bradley Corporation.
2. Mounting: Recessed mounted.
3. Minimum Capacity: 600 C-fold or 800 multifold towels.
4. Material and Finish: Stainless steel, No. 4 finish (satin).
5. Lockset: Tumbler type.
6. Refill Indicator: Pierced slots at front.

C. Liquid-Soap Dispenser (SD) surface mounted to be provided by Owner installed by Contractor.

D. Grab Bar:

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. American Specialties, Inc.
 - b. Bobrick Washroom Equipment, Inc.
 - c. Bradley Corporation.

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2. Mounting: Flanges with concealed fasteners.
3. Material: Stainless steel, 0.05 inch thick.
 - a. Finish: Smooth, No. 4 finish (satin) on ends and slip-resistant texture in grip area.
4. Outside Diameter: 1-1/2 inches.
5. Configuration and Length: As indicated on Drawings.

E. Sanitary-Napkin Disposal Unit (SN):

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. American Specialties, Inc. Model #0852 (basis of design)
 - b. Bobrick Washroom Equipment, Inc.
 - c. Bradley Corporation.
2. Mounting: Surface mounted.
3. Door or Cover: Self-closing, disposal-opening cover and hinged face panel with tumbler lockset.
4. Receptacle: Removable.
5. Material and Finish: Stainless steel, No. 4 finish (satin).

F. Mirror Unit (MR):

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. American Specialties, Inc.
 - b. Bobrick Washroom Equipment, Inc.
 - c. Bradley Corporation.
2. Frame: Stainless-steel channel.
 - a. Corners: Welded and ground smooth.
3. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.
 - a. One-piece, galvanized-steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
4. Size: 18" X 36" unless otherwise noted.

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G. Baby Changing Station (BCS):

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. American Specialties, Inc. Model #9013-9 (basis of design)
 - b. Bobrick Washroom Equipment, Inc.
 - c. Bradley Corporation.
2. Frame: Stainless-steel exterior sides and end panels polished to a #4 satin finish.
 - a. Corners: Welded and ground smooth.
3. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.
 - a. One-piece, galvanized-steel, wall-hanger device with spring-action locking mechanism to hold Baby Changing Station unit in position with no exposed screws or bolts.
4. Size: 25.25" tall X 37" wide X 4" deep unless otherwise noted.

H. Waste Receptacle (WR):

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. American Specialties, Inc.
 - b. Bobrick Washroom Equipment, Inc. Model #B-2280 21 gal. open top (basis of design)
 - c. Bradley Corporation.
2. Frame/exterior material: 304 22ga. Stainless-steel polished to #4 satin finish.
 - a. Corners: Welded and ground smooth.
3. Size: 29.25" tall X 14.875" square unless otherwise noted.

2.3 UNDERLAVATORY GUARDS

A. Underlavatory Guard at each sink:

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1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Plumberex Specialty Products, Inc.
 - b. Truebro by IPS Corporation.
2. Description: Insulating pipe covering for supply and drain piping assemblies that prevents direct contact with and burns from piping; allow service access without removing coverings.
3. Material and Finish: Antimicrobial, molded plastic, white.

2.4 CUSTODIAL ACCESSORIES

A. Utility Shelf at each Janitor's Room:

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. American Specialties, Inc.
 - b. Bobrick Washroom Equipment, Inc.
 - c. Bradley Corporation.
2. Description: With exposed edges turned down not less than 1/2 inch and supported by two triangular brackets welded to shelf underside.
3. Size: 16 inches long by 6 inches deep.
4. Material and Finish: Not less than nominal 0.05-inch- thick stainless steel, No. 4 finish (satin).

B. Mop and Broom Holder at each Janitor's Room:

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. American Specialties, Inc.
 - b. Bobrick Washroom Equipment, Inc.
 - c. Bradley Corporation.
2. Description: Unit with shelf, hooks, holders, and rod suspended beneath shelf.
3. Length: 36 inches.
4. Hooks: Four.
5. Mop/Broom Holders: Three, spring-loaded, rubber hat, cam type.
6. Material and Finish: Stainless steel, No. 4 finish (satin).

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- a. Shelf: Not less than nominal 0.05-inch- thick stainless steel.
- b. Rod: Approximately 1/4-inch- diameter stainless steel.

C. Paper Towel (Folded) Dispenser (PT):

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Specialties, Inc.
 - b. Bobrick Washroom Equipment, Inc.
 - c. Bradley Corporation.
- 2. Mounting: Surface mounted.
- 3. Minimum Capacity: 400 C-fold or 525 multifold towels.
- 4. Material and Finish: Stainless steel, No. 4 finish (satin).
- 5. Lockset: Tumbler type.
- 6. Refill Indicator: Pierced slots at sides or front.

D. Liquid-Soap Dispenser (SD to be provided by Owner) installed by Contractor:

2.5 FABRICATION

- A. 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 ASTM F 446.

END OF SECTION 102800

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SECTION 104413 - FIRE PROTECTION CABINETS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes fire-protection cabinets for portable fire extinguishers.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For fire-protection cabinets.

1.3 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.4 COORDINATION

- A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
- B. Coordinate sizes and locations of fire-protection cabinets with wall depths.

PART 2 - PRODUCTS

2.1 FIRE-PROTECTION CABINET

- A. Cabinet Type: Suitable for fire extinguisher.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Specialties, Inc.
 - b. JL Industries, Inc.; a division of the Activar Construction Products Group.
 - c. Larsens Manufacturing Company.
- B. Cabinet Construction: Nonrated.
- C. Cabinet Material: Cold-rolled steel sheet.

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- D. Semirecessed Cabinet: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
 - 1. Rolled-Edge Trim: 2-1/2-inch backbend depth.
- E. Cabinet Trim Material: Stainless-steel sheet.
- F. Door Material: Stainless-steel sheet.
- G. Door Style: Center glass panel with frame.
- H. Door Glazing: Acrylic sheet.
 - 1. Acrylic Sheet Color: Clear transparent acrylic sheet.
- I. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
- J. Accessories:
 - 1. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle.
 - 2. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as directed by Architect.
 - a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER."
 - 1) Location: Applied to cabinet door.
 - 2) Application Process: Pressure-sensitive vinyl letters.
 - 3) Lettering Color: Red.
 - 4) Orientation: Vertical.
- K. Materials:
 - 1. Cold-Rolled Steel: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
 - a. Finish: Baked enamel or powder coat.
 - b. Color: White.
 - 2. Stainless Steel: ASTM A 666, Type 304.
 - a. Finish: No. 4 directional satin finish.
 - 3. Transparent Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet), 6 mm thick, with Finish 1 (smooth or polished).

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2.2 FABRICATION

- A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Prepare recesses for semirecessed fire-protection cabinets as required by type and size of cabinet and trim style.
- B. Install fire-protection cabinets in locations and at mounting heights indicated
- C. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.
- D. Identification: Apply vinyl lettering at locations indicated.
- E. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

END OF SECTION 104413

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SECTION 104416 - FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes portable, hand-carried fire extinguishers.

1.2 ACTION SUBMITTALS

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

1.3 INFORMATIONAL SUBMITTALS

- A. Warranty: Sample of special warranty.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.5 COORDINATION

- A. Coordinate type and capacity of fire extinguishers with fire-protection cabinets to ensure fit and function.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

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- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

- A. Fire Extinguishers: Type, size, and capacity for each fire-protection cabinet 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. Amerex Corporation.
 - b. JL Industries, Inc.; a division of the Activar Construction Products Group.
 - c. Larsens Manufacturing Company.
 - 2. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B.
- B. Multipurpose Dry-Chemical Type: UL-rated 10lb. nominal capacity, with monoammonium phosphate-based dry chemical in manufacturer's standard enameled container.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Examine fire extinguishers for proper charging and tagging.
 - 1. Remove and replace damaged, defective, or undercharged fire extinguishers.
- B. Install fire extinguishers in locations indicated and in compliance with requirements of authorities having jurisdiction.

END OF SECTION 104416

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SECTION 11 1400 – AUTOMATED EXIT LANE SECURITY CORRIDOR

PART 1 GENERAL

101 SECTION INCLUDES

- A. This section covers the furnishing and installation of a complete Automatic Security Breach Control System. Provide complete system that has been fabricated and tested for proper operation at the factory. It includes side walls, canopy, ceiling, automatic doors, hardware, glass, drive systems, sensor systems, and guide rails.

102 RELATED SECTIONS

- A. Section 07915 – Sealants, Caulking and Seals
- B. Section 08400 – Entrance and Storefronts
- C. Section 08710 – Door Hardware
- D. Section 08810 – Glass and Glazing
- E. Section 09600 – Flooring
- F. Section 16123 – Electrical Supply and Termination

103 QUALITY ASSURANCE

- A. Manufacturer shall be a company specializing in the supply of automatic security breach doors with a minimum of 10 years' experience.
- B. Manufacturer must be able to provide a minimum of ten (10) references and have a minimum of twenty (20) exit lane breach control systems installed and operating in North American airports.
- C. Manufacturer must have received TSA approval for unmanned operation at all installations.

104 SUBMITTALS

- A. Submit project shop drawings and finish samples.
- B. Indicate pertinent dimensions, general construction, component connections, anchorage methods and locations.

105 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to job site in manufacturer's packaging undamaged, complete with installation instructions.
- B. Store off ground, under cover, protected from weather and construction activities.

106 PROJECT/SITE CONDITIONS

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- A. Install security breach doors on finished floor only. Floor must be level $\pm 1/16"$ (1.5mm) at all locations within the footprint of the security breach door.

107 WARRANTY

Manufacture warrants its products against defects in material and workmanship for a period of one (1) year from the date of substantial completion. This warranty excludes glass breakage, normal wear on finishes or damage that occurs due to abuse, misuse or acts of God.

108 SERVICE

- A. Manufacture to provide a per lane cost to provide once or twice a year on site service by factory employed and trained technicians.

109 MANUFACTURING LOCALE

- A. The security exit lane should be wholly manufactured in the United States and using metals acquired in the US. Assembly of electronics, components and structure shall take place fully in a manufacturing facility in the United States.

PART 2 PRODUCTS

2.01 MANUFACTURER

Record- USA as basis of design. Other manufactures must be pre-approved prior to receiving bids.

4324 Phil Hargett Court
Monroe, NC 28110
(800) 438-1937

2.02 FUNCTION

- A. The FlipFlow security breach door system is an automatic high capacity anti-pass back system, providing the regulations of passenger/user traffic flow in airports, industrial manufacturing facilities, and other sensitive areas in various types of buildings. Pedestrians may pass through the FlipFlow in single file and in one direction only. Attempts at reverse entry are detected by an intelligent sensor system and the automatic doors will inhibit such action. In addition, an alarm is generated locally and an alert message is generated for remote monitoring.

2.03 APPLICATIONS

- A. Passenger flow regulation in airports (separates the secure airside from the non-secure landside)
- B. Protection of other sensitive areas in seaports and railway stations.
- C. Access to sensitive areas in public, commercial, and industrial buildings

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- D. Entrance to court houses or judicial buildings
- E. Side entrance in supermarkets

2.04 CONSTRUCTION

- A. Self-supporting aluminum construction, clad in stainless steel. **The unit is capable of free-sanding, however, units installed in seismic areas requiring special anchoring and attachment shall be tied into a supporting structure**
- B. Triple (three sets of doors) configuration required.
- C. Three double leaf record-usa door operators are provided as standard for a long life.
- D. Entrance, middle doors and exit doors are supplied with robust electromechanical brakes or optionally electromagnetic locks to inhibit door open motion in fully closed position.
- E. A master control, supplemented with a modular, expandable sensor system, monitors passenger flow.
- F. Transparent side panels in laminated security glass facilitate monitoring requirements.
- G. Passage status is indicated by red/green traffic-light style indicators at both the entrance and exit doors.
- H. Interior lighting is provided by six (6) halogen spot lights.
- I. Width of unit shall be at least:
 - a. 1200mm (47" Clear Opening) opening width to allow for wheelchair access
- J. Overall dimensions:
 - b. Triple (3 doors) 6345mm (20'-9 3/4") long x 2363mm (7'-9") high
 - c. Provide optional Extension 1956mm (6'-5") long x 1042mm (3'-5") high
- K. The space between the top of the unit and the ceiling above must be closed off, or limited, to prevent objects from being throw over, or set on top of the unit.
- L. Object detection on all side walls, ceiling and floor is required.
- M. Flow mode to interlock mode must have an optional automated setting and able to be controlled without personnel having to physically visit the lane.
- N. Wall structures and posts shall be clad in stainless steel, unless otherwise directed, allowing for easy removal of the clad covers for maintenance and replacement of damaged components in the form of dents, scratches, etc., from luggage and regular use.

2.05 SENSORS

- A. Sensors- Sensors for the SEL must utilize TOF-3D, an automatic anti-return detection sensor with high resolution. The TOF 3-D sensor utilizes a matrix of 500 pixels with which the sensor measures the distance to the

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object and captures it three-dimensionally. This is made possible by Time-Of-Flight (TOF) technology which calculates the distance to the object by measuring the light travel time.

- B. This sensor shall also facilitate reliable anti-return object detection under adverse environmental influences such as extraneous light, humidity, or dirt. This makes it possible to determine the presence, stature and movement of people and objects within the field of vision with very high accuracy.
- C. The sensor system shall not require dependency from low or ambient light and also perform in complete darkness in case of power outages or emergency scenarios. Detection of small objects and crawling people within the tunnel while the doors are open is mandatory. Alternates will not be accepted.
- D. Video analytic systems not permissible.

2.06 SURFACE TREATMENT

- A. Aluminum frame:
 - a. Stainless Steel Clad
 - 1. Cladding material to be easily replaced in case of damage
 - b. Standard RAL colors
 - c. Power Coated to match architectural specification

2.07 GLASS SPECIFICATIONS

- A. Wall Panels and Glass doors are 5/16" laminated safety glass
- B. Extensions are 1/2" safety glass

2.08 ELECTRICAL/CAT6

- A. 110 Volt @ 20amp (per lane) Maximum power requirements:
 - i. 1000 Watts for Flip Flow Triple with extension gates
 - ii. 200 Watts in Standby mode
- B. CAT6 Ethernet connection is required

2.09 OPERATION MODES

- A. FLOW MODE
 - a. Motion sensor detects approaching pedestrian(s) and actuates entrance doors.
 - b. Pedestrian(s) proceed into the anti-pass-back passageway.
 - c. The entrance doors close when motion is no longer detected and a presence is not detected in the door leaf swing areas.
 - d. The pedestrian(s) continue through the passageway.
 - e. A motion sensor in the passageway detects pedestrian(s) and actuates

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the exit doors. If equipped with three doors the process is repeated through a second set of doors and into a second chamber, at which time the exit doors are actuated.

- f. Infra-red cameras are used to body track heat signature direction and detect possible pass through attempts
- g. Pedestrian(s) exit the anti-pass-back passageway(s).
- h. Red/Green traffic lights indicate when passage is allowed.
- i. Interior spot lights are on.
- j. Both entrance, middle, and the exit doors may be open at the same time.
- k. Pedestrians who passed more than one-half way through the passageway cannot reverse direction without causing the entrance doors to close and lock.

B. INTERLOCK MODE

- a. Motion sensor detects approaching pedestrians(s) and actuates entrance doors.
- b. Pedestrian(s) proceed into the anti-pass-back passageway.
- c. Threshold safety beams
 - i. Inhibit closing if the threshold is occupied.
 - ii. After the entrance doors have closed, the interior doors and exit doors will automatically open, allowing exit from the passageway. A pedestrian in the passageway will have a nominal 5 -6 second delay before exiting.
- d. The entrance door closes when motion is no longer detected, or if 3 or more pedestrians have entered the passageway.
- e. When all pedestrians have exited the passageway, the interior doors and exit doors will close.
 - i. The interior of the passageway(s) are scanned for objects, and if clear, the entrance doors will automatically re-open.
 - ii. If objects are detected, the entrance doors will remain closed and the interior doors and exit doors will reopen and remain open until the object has been removed.
- f. Red/Green traffic lights indicate when passage is allowable.
- g. Interior spot lights are on.
- h. The entrance, interior doors and the exit doors are interlocked and prevented from being open at the same time.

C. OPEN MODE

- a. Entrance and exit doors are kept open.
- b. Back Flow detection can be disabled to allow free passage in both directions of the tunnel
- c. The monitoring sensor systems are disabled with optional alarm contact available to indicate incorrect walking direction.

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- d. Green traffic light indicates unhindered passage.
- e. Interior spot lights are on.
- D. LOCKED MODE
 - a. Both entrance and exit doors closed and locked.
 - b. Traffic through the FlipFlow is inhibited in both directions.
 - c. Red traffic lights indicate no access.
 - d. Interior spot lights are off.
- E. EMERGENCY MODE
 - a. Both automatic doors are equipped with battery packs.
 - i. During a power failure, the doors complete a final movement (entrance doors are closed and locked; exit doors are opened). The tunnel can be freely exited to the landside.
 - b. An emergency open button as well as a phone inside the tunnel is a recommended option for emergency evacuations.
- F. EVACUATION MODE
 - a. Allows the opening of both doors in emergency evacuation scenarios under the
 - i. Highest priority without addressing any means of security. This mode will be triggered via a hard wired contact or via a TCP/IP connection remotely. See also section 2.08
- G. MAINTENANCE AND CLEANING
 - a. An optional key switch will be installed to allow maintenance personnel to access the lane during a preset time. During this time the alarms are not triggered.
 - i. Allows a service technician to access, service, adjust, and test the FlipFlow.
 - ii. A local audible alarm is actuated if the maintenance switch is not reset after a preset, configurable time delay.
 - iii. Dry contact output can be used for remote monitoring of service hatch access.
 - b. An optional contact for a key-switch (switch by others) that allows for simple cleaning of the passageway is available.
 - i. Access to interior of passageway is by opening the Exit doors; the Entry doors are closed and locked.
 - ii. Alarm outputs are suppressed.
 - iii. A local audible alarm is actuated if the cleaning mode switch is not reset after a preset, configurable time delay.
 - iv. Dry contact output, similar to above Alarm Outputs, can be used for remote monitoring of service hatch access.

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H. AUTOMATED FLOW TO INTERLOCK MODE

- a. Detects flow increases and decreases and automatically converts Flow Mode to Interlock Mode and vice versa without the requirement of airport personnel having to physically go to the lane.

2.10 OPTIONS TO BE INCLUDED:

A. INSIDE MONITORING AND OBJECT DETECTION- Infrared and microwave of sensors allow for monitoring the interior passageway of the FlipFlow.

- a. Detection of objects as small as 2” by 2” by 2” (50mm x 50mm x 50mm) at the floor and ceiling and sidewalls

B. OBJECT DETECTION – the following options are available individually or in combination:

- a. Detection of stationary objects attached to interior ceiling, sidewalls and floor.

C. SIDE RAILS AND BARRIER AT EXIT

- a. Additional glass guide rails are installed on the exterior or the exit doors, and:
 - i. include two low height stainless steel swing barrier gates. This will increase security and deter attempts to enter the exit door from the landside. Inhibiting access on the landside will reduce nuisance interference of the exit doors and subsequently increase throughput of the FlipFlow.
- b. Additional glass tunnel to extend the whole system to a TRIPLE unit with
 - i. Three sets of swing doors; the length of the TRIPLE tunnel is approx.20’-9” (6352mm)

D. SERVICE DISPLAY- the record- usa service display module is designed primarily for use by service technicians, and provides the following features:

- a. Adjustments and modification of operational mode parameters.
- b. Adjustment of various timers according to customer’s requirements.
- c. Display status of digital inputs and relays outputs.
- d. Display error messages in user-friends text.
- e. Password protected access levels.
- f. To meet individual requirements, this useful tool is provided in two alternative physical packages:
 - i. Securely integrated into each FlipFlow, or
 - ii. As a portable service tool, compatible with all current FlipFlow units.

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- E. BATTERY BACK UP- one cycle open after the detection of loss of power
 - a. Implementation of an UPS (uninterrupted power supply) backup system to guarantee the operation of up to three hours.
- F. REAL TIME MONITORING- offers airport security personnel the ability to monitor the status of all Flip Flow units.
 - a. When an airport allows temporary access to the local PC that runs the record REALTIME software via remote monitoring, record has the ability to support and assist in resolving problematic occurrences.
 - i. Allows for security personnel to receive e-mail alerts of events
 - ii. Allow for staff to monitor doors with smart phone tablet type of devices

2.11 INCORRECT USE AND ALARM OUTPUTS

- A. A local audible alarm is actuated when an alarm occurs. A PLC output, rated 25W at 24VDC, will actuate, and can be used to turn on a flashing strobe for visual notification. Additionally, the following individual alarm outputs are provided, each with dedicated dry contacts, and can be used for remote monitoring and/or integration with a building management system.
 - INTRUSION: An audible alarm is immediately enabled when the pass-back sensors are triggered while the entry door was still open signaling the possibility that a person was able to clear the doors prior to closing and locking
 - WRONG DIRECTION: An audible alarm is immediately enabled if a pedestrian has travelled more than half-way through the passageway then stops and attempts to turn around and walk back through the entry doors.
 - FLOW DISTURBANCE: An audible alarm is enabled when normal traffic flow has been hindered by external influences. This includes obstructing access to travelling through the FlipFlow, and/or detection of a person or object in the FlipFlow passageway when both entry and exit doors are closed.
 - TECHNICAL DISTURBANCE: A malfunction in either of the door operators or the monitored sensors and cameras will enable the audible alarm, and actuate a separate dry contact.
 - 8 Dry contact outputs are available

2.12 REMOTE CONTROL

- A. REMOTE CONTROL: Inputs are provide for external control of the following functions, and can be controlled by remote contacts or a building management system, and have priority over the local controller.

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- a. Immediately open both Entry, interior doors and the Exit doors (Evacuation mode).
- b. Immediately close and lock the Entry doors, and open the interior doors and the exit doors.
- c. Switch the FlipFlow from interlock mode, and back automatically.

PART 3 EXECUTION

3.01 EXAMINATION AND PREPARATION

- A. Installer shall examine the location and advise of any site conditions unacceptable for proper installation of the product. These conditions include, but are not limited to the following:
 - a. Identification and planning for expansion joints, project access, onsite staging areas.
 - i. Site configuration/temporary construction enclosures, and work hours as related to other activities.
 - ii. Floor must be leveled and smooth with no deviations in excess of 1/16" from a twelve (12) foot location, in any direction.
 - iii. The ability for the breach door system to be installed level shall be verified prior to installation of any part of the security breach door system.
 - iv. Power supply must be installed and verified to be of the correct voltage.
 - v. Required facility systems such as security interface and electrical power must be ready for connection/termination at time of installation.

3.02 INSTALLATION

- A. System shall be installed by factory employed and certified installers
- B. System shall be commissioned by factory technicians.
- C. System shall be installed in accordance with manufacturer's provided instructions.
- D. System must be set level, plumb, with uniform hairline joints, and anchored securely into place.
- E. Assembly dimensional tolerances, as indicated within manufacturing are recommended instructions must be maintained.
- F. All alignment with adjacent work must be maintained.
- G. Coordinate installation with facility requirements such as electric power, security interface and cat6 connections.
- H. Door(s) must meet all safety codes and standards.
- I. Adjust door, hardware and sensors for smooth operation and smooth performance.
- J. Installation crew should be proven to have five (5) confirmed and successful installations within the United States.
- K. Factory installer shall demonstrate to the owner's dedicated staff the

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proper operation of the exit lane system and the necessary service requirements such as lubrication, cleaning, and inspection of components.

3.03 OPERATIONAL ADJUSTMENTS

- A. Operational adjustments in the field shall be achievable with trained field personnel. An engineer from the manufacturer should not be required to adjust the physical system or software programming.

3.04 TRAINING

- A. Manufacturer/installer shall provide two (2) hours of on-site training for the necessary airport personnel on the functions and use of the exit lanes.

3.05 MAINTENANCE PLAN

- A. Manufacture shall offer an onsite annual, semiannual or quarterly maintenance plan options at an additional cost for planned service provided by factory trained technicians, to suit the owner's needs.

END OF SECTION

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SECTION 122113 - HORIZONTAL LOUVER BLINDS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Horizontal louver blinds with aluminum slats.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For horizontal louver blinds, include fabrication and installation details.
- C. Samples: For each exposed product and for each color and texture specified, 12 inches long.

1.3 INFORMATIONAL SUBMITTALS

- A. Product test reports.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance data.

PART 2 - PRODUCTS

2.1 HORIZONTAL LOUVER BLINDS, ALUMINUM SLATS

- A. Slats: Aluminum; alloy and temper recommended by producer for type of use and finish indicated; with crowned profile and radius corners.
 1. Width: 1 inch.
 2. Thickness: Manufacturer's standard.
 3. Features:
 - a. Lift-Cord Rout Holes: Minimum size required for lift cord and located near back (outside) edge of slat to maximize slat overlap and minimize light gaps between slats.
 - b. Perforated Slats: Openness factor of 6 to 7 percent.

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- B. Headrail: Formed steel or extruded aluminum; long edges returned or rolled. Headrails fully enclose operating mechanisms on three sides.
 - 1. Manual Lift Mechanism:
 - a. Lift-Cord Lock: Top locking; stops lift cord when blind is in fully opened or fully closed positions only; equipped with ring pull not more than 4 inches long.
 - b. Operator: Extension of lift cord(s) through lift-cord lock mechanism to form cord pull.
 - 2. Manual Tilt Mechanism: Enclosed worm-gear mechanism and linkage rod that adjusts ladders.
 - a. Tilt: Full.
 - b. Operator: Clear-plastic wand.
 - 3. Manual Lift-Operator and Tilt-Operator Lengths: Manufacturer's standard.
- C. Bottom Rail: Formed-steel or extruded-aluminum tube that secures and protects ends of ladders and lift cords and has plastic- or metal-capped ends.
 - 1. Type: Manufacturer's standard.
- D. Ladders: Reinforced vinyl tape, manufacturer's standard width.
- E. Valance: Manufacturer's standard.
- F. Mounting Brackets: With spacers and shims required for blind placement and alignment indicated.
- G. Side Channels and Perimeter Light Gap Seals: Manufacturer's standard.
- H. Colors, Textures, Patterns, and Gloss:
 - 1. Slats: As selected by Architect from manufacturer's full range.
 - 2. Components: Provide rails, cords, ladders, and materials exposed to view matching or coordinating with slat color unless otherwise indicated.

2.2 HORIZONTAL LOUVER BLIND FABRICATION

- A. Product Safety Standard: Fabricate horizontal louver blinds to comply with WCMA A 100.1 including requirements for corded, flexible, looped devices; lead content of components; and warning labels.
- B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F:
 - 1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which blind is installed less 1/4 inch per side or 1/2 inch total, plus or minus 1/8 inch. Length equal to head-to-sill dimension of opening in which blind is installed less 1/4 inch, plus or minus 1/8 inch.

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PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install horizontal louver blinds level and plumb, aligned and centered on openings, and aligned with adjacent units according to manufacturer's written instructions.
 - 1. Locate so exterior slat edges are not closer than 1 inch from interior faces of glass and not closer than 1/2 inch from interior faces of glazing frames through full operating ranges of blinds.
 - 2. Install mounting and intermediate brackets to prevent deflection of headrails.
 - 3. Install with clearances that prevent interference with adjacent blinds, adjacent construction, and operating hardware of glazed openings, other window treatments, and similar building components and furnishings.
- B. Adjust horizontal louver blinds to operate free of binding or malfunction through full operating ranges.
- C. Clean horizontal louver blind surfaces after installation according to manufacturer's written instructions.

3.2 SCHEDULE

- A. Provide blinds for full window covering at exterior windows in the following locations:
 - 1. Room C101 Office.
 - 2. Room C107A Office.
 - 3. Room C108A Office.
 - 4. Room C109A Office.
 - 5. Room C110A Office.
 - 6. Room C111A Office.
 - 7. Room E213 Nursery.
 - 8. Room E218 Pilots Lounge.
 - 9. Room G116 Office Lobby.
 - 10. Room G117 Office.
 - 11. Room G119 Office.
 - 12. Room G121 Admin. Assistant.
 - 13. Room G129 Office.
 - 14. Room G130 Office.
 - 15. Room G131 Office.
- B. Provide blinds for full window covering at interior windows in the following locations:
 - 1. Room C101 Office.

END OF SECTION 122113

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SECTION 123661.16 - SOLID SURFACING COUNTERTOPS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Solid surface material countertops.
2. Solid surface material backsplashes.
3. Solid surface material end splashes.
4. Solid surface material apron fronts.
5. Solid surface material sinks.

1.2 ACTION SUBMITTALS

- A. Product Data: For countertop materials and sinks.
- B. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.
- C. Samples: For each type of material exposed to view.

1.3 QUALITY ASSURANCE

- A. Fabricator Qualifications: Certified participant in AWI's Quality Certification Program.
- B. Installer Qualifications: Certified participant in AWI's Quality Certification Program.

PART 2 - PRODUCTS

2.1 SOLID SURFACE COUNTERTOP MATERIALS

- A. Solid Surface Material: Homogeneous-filled plastic resin complying with ICPA SS-1. Corian Clam Shell is an approved equal to that specified herein.
 1. Type: Provide Standard type unless Special Purpose type is indicated.
 2. Integral Sink Bowls: Comply with CSA B45.5/IAPMO Z124.
 3. Colors and Patterns: Wilsonart "Jovian 9211CM".

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2.2 COUNTERTOP FABRICATION

- A. Fabricate countertops according to solid surface material manufacturer's written instructions and to the AWI/AWMAC/WT's "Architectural Woodwork Standards."
 - 1. Grade: Premium.
- B. Configuration:
 - 1. Front: Straight, slightly eased at top with separate apron, 6 inches high, recessed 1/4-inch behind front edge.
 - 2. Backsplash: Straight, slightly eased at corner.
 - 3. End Splash: Matching backsplash.
- C. Countertops: 1/2-inch- thick, solid surface material.
- D. Backsplashes: 1/2-inch- thick, solid surface material.
- E. Joints: Fabricate countertops without joints.
- F. Cutouts and Holes:
 - 1. Undercounter Plumbing Fixtures: Make cutouts for fixtures in shop using template or pattern furnished by fixture manufacturer. Form cutouts to smooth, even curves.

2.3 INSTALLATION MATERIALS

- A. Adhesive: Product recommended by solid surface material manufacturer.
- B. Sealant for Countertops: Comply with applicable requirements in Section 079200 "Joint Sealants."

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Predrill holes for screws as recommended by manufacturer.
- B. Install backsplashes and end splashes by adhering to wall and countertops with adhesive.
- C. Install aprons to backing and countertops with adhesive.
- D. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. Make cutouts to accurately fit items to be installed, and at right angles to

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finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.

- E. Apply sealant to gaps at walls; comply with Section 079200 "Joint Sealants."

END OF SECTION 123661.16

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Section 14240 - Elevator

PART 1 - GENERAL

1.1 Description

- A. Work Included: The extent of the work is indicated on the drawings.
- B. Work of this Section includes labor, materials, tools, equipment, appliances and services required to manufacture, deliver and install the units complete as shown on the drawings, as specified herein, and/or as required by job conditions.
- C. The work and /or requirements specified in all sections is described in singular with the understanding that identical work shall be performed on all units or associated systems unless otherwise specified herein.
- D. The work shall include, but is not limited to the following:
 - 1. One (1) 4500 lbs. capacity Dual Jack Hole-Less hydraulic service elevator operating at 125 fpm. (Service Concourse "B" – Add Alternate G1)
 - 2. One (1) 5000 lbs. capacity Dual Jack Hole-Less hydraulic service elevator operating at 125 fpm. (Service Main Terminal Lobby)
 - 3. One (1) 2100 lbs. capacity Dual Jack Hole-Less hydraulic passenger elevator operating at 110 fpm. (Replacement for existing single piston jack elevator in existing shaft to remain)
- E. Related Sections:
 - 1. Division 01: Protecting hoistway during installation of equipment, Construction Waste Management, Indoor Air Quality Management, Volatile Organic Compound Limits.
 - 2. Division 01: Protecting wellway during installation of the equipment.
 - 3. Division 03: Cutting and patching.
 - 4. Division 03: Concrete pits and slabs.
 - 5. Division 03: Wellway, pits and supports for truss
 - 6. Section 03 60 00: Grouting under hoistway door sills.
 - 7. Section 05 12 00: Structural steel.
 - 8. Section 05 50 00: Access Ladders, smoke hole grating, railing and inspection platforms, intermediate support members, sump pit covers.
 - 9. Section 05 70 00: Interior Ornamental Metals.
 - 10. Division 07: Elevator pit waterproofing.
 - 11. Section 08 80 00: Interior Glass and Glazing.
 - 12. Section 09 20 00: Shaft and machine / control room walls.
 - 13. Division 26: Power feeders to starter panels through fused main line switches
 - 14. Division 26: Branch circuits through fused disconnects for car lights.

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15.	Division 26:	Lights and GFI receptacles in machine / control room and pit
16.	Division 26:	Signal wiring to initiate emergency power operation. (if provided)
17.	Division 26:	Signal wiring from smoke detectors to a junction box in the machine space.
18.	Division 26:	Empty conduit runs for wiring required to monitor elevators from a central location.
19.	Division 26:	Shunt trip devices to automatically disconnect the main power supply to the elevators prior to the activation of sprinkler system.
20.	Division 27:	Life safety system speakers and telephone communication wiring to a junction box in the machine / control room for each elevator.
21.	Division 27:	Card reader and CCTV Systems, device and their interface with the elevator system.
22.	Division 27:	Telephone communications wiring terminated in a junction box located next to the controller.
23.	Division 27:	Ethernet port in each elevator machine room and fire command Center
24.	Section 09 60 00:	Finished flooring.
25.	Division 23:	Ventilation of hoistway, machine, control room and fire extinguisher in machine /control room.
26.	Division 26:	Power feeders to fused main line switches
27.	Division 26:	Branch circuits through fused disconnects for car lights.
28.	Division 26:	Lights and GFI receptacles in machine / control room, overhead, and pit.
29.	Division 26:	Division 26: Signal wiring to initiate emergency power operation. (if provided)
30.	Division 26:	Division 26: Empty conduit runs for wiring required to monitor elevators from a central location.
31.	Division 26:	Shunt trip devices to automatically disconnect the main power supply to the elevators prior to the activation of sprinkler system.
32.	Division 27:	Life safety system speakers and telephone communication wiring to a junction box in the machine / control room for each elevator.
33.	Division 27:	Card reader and CCTV Systems, device and their interface with the elevator system.
34.	Division 27:	Telephone communications wiring terminated in a junction box located next to the controller.
35.	Division 27:	Ethernet port in each elevator machine, fire command center and building engineer's office.

F. Abbreviations and Symbols

1. The following abbreviations, Associations, Institutions, and Societies may appear in the Project Manual or Contract Documents:

AHJ	Authority Having Jurisdiction
AIA	American Institute of Architects
ANSI	American National Standards Institute

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ASME	American Society of Mechanical Engineers
ASTM	D1785 - PVC Pipe
ASTM	D2466 – PVC Pipe Fittings
ASTM	D2564 – Cement for PVC Pipe and Fittings
ASTM	American Society for Testing and Materials
AWS	American Welding Society
IBC	International Building Code
IEEE	Institute of Electrical and Electronics Engineers
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Agency
OSHA	Occupational Safety and Health Act

G. Codes and Ordinances / Regulatory Agencies

1. Work specified by the Contract Documents shall be performed in compliance with applicable Federal, State, and municipal codes and ordinances in effect at the time of Contract execution. Regulations of the Authority Having Jurisdiction shall be fulfilled by the Contractor and Subcontractors. The entire installation, when completed, shall conform with all applicable regulations set forth in the latest editions of:
 - a. Local and/or State laws applicable for logistical area of project work.
 - b. Building Code applicable to the AHJ.
 - c. Elevator Code applicable to the AHJ.
 - d. Safety Code for Elevators and Escalators, ASME A17.1 and all supplements as modified and adopted by the AHJ.
 - e. Safety Code for Elevators and Escalators, A17.1S supplement to A17.1 as modified and adopted by the AHJ for Machine Room Less installations (MRL).
 - f. Guide for Inspection of Elevators, Escalators, and Moving Walks, ASME A17.2.
 - g. Safety Code for Existing Elevators and Escalators, ASME A17.3 as modified and adopted by the AHJ.
 - h. Guide for emergency evacuation of passengers from elevators, ASME A17.4.
 - i. National Electrical Code (ANSI/NFPA 70).
 - j. American With Disabilities Act - Accessibility Guidelines for Building and Facilities and/or A117.1 Accessibility as may be applicable to the AHJ.
 - k. ASME A17.5/CSA-B44.1 - Elevator and escalator electrical equipment.
2. The Contractor shall advise the Owner's Representative of pending code changes that could be applicable to this project and provide quotations for compliance with related costs.

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H. Reference Standards

1. AISC - Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.
2. ANSI/AWS D1.1 - Structural Welding Code, Steel.
3. ANSI/NFPA 80 - Fire Doors and Windows.
4. ANSI/UL 10B - Fire Tests of Door Assemblies.

I. Definitions

1. Defective Work: Operation or control system failure, including excessive malfunctions; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.
2. Provide: Where used in this document, provide shall mean to install new device, apparatus, system, equipment or feature as specified in this document.
3. Definitions in ASME A17.1 as amended or modified by the AHJ apply to work of this Section.

1.2 PERMITS AND SUBMITTALS

A. Permits

1. Comply with the requirements of Division 01.
2. Prior to commencing work specified by the Contract Documents, the Contractor shall, at its own expense, obtain all permits or variances as may be required by the AHJ and provide satisfactory evidence of having obtained said permits and variances to both the Owner's Representative and Consultant.
3. File necessary drawings for approval of all Authorities Having Jurisdiction.

B. Submittals

1. Comply with the requirements of Division 01.
2. Submit the following

a. Samples

Item No.	Quantity	Size	Description
S1	3	12" x 12"	Exposed finishes as requested by Architect
S2	1	Actual	Each fixture as requested by the Architect

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S3	1	Actual	Mitered, corner construction of entrance frame

b. The samples shall be:

- 1) Held on site after inspection and used as a standard for acceptance or rejection of subsequent production units.
- 2) Labeled to identify their intended use and relation to the documents, e.g., car finishes, control panel, etc.
- 3) Returned to the elevator contractor at the completion of the project.

Subject to approval, where an item of equipment is a standard item, copies of the manufacturer's catalogue or brochure may be accepted provided that all dimensions and relevant information are shown in the catalogue or brochure.

c. Shop Drawings - Submit computer generated layout drawings for approval. Include the following:

- 1) A listing of all components, devices and sub-systems including:
 - a) Manufacturer and location of plant
 - b) Size and model number
- 2) Machine Room Plan indicating:
 - a) Power unit weight
 - b) Oil line and conduit routing
 - c) Reactions
 - d) Location of equipment and code clearances
 - e) Service connections and disconnect switches
 - f) CCTV provisions
- 3) Fully dimensioned hoistway plan and section of each unit indicating:
 - a) Platform (with cab), hoistway and entrance dimensions
 - b) All running clearances
 - c) Location of fixtures
 - d) Buffers, service ladders and pit reactions
 - e) Location of inserts
 - f) Rail Reactions
- 4) Entrance details
- 5) Sill support detail
- 6) Fixture details including hall lanterns, hall pushbutton stations, car operating panel, etc.
- 7) Wiring diagrams

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- 8) Insert diagrams
- 9) Cab details including wall, ceiling, base, handrail, lighting, fixtures, front return and transom plans and sections

3. Calculations

- a. Rail loads
- b. Pit reactions
- c. Heat emissions in machine room
- d. Electrical loads including, accelerating and running currents. Include all auxiliary loads.

C. Keys

- 1. Upon the initial acceptance of work specified by the Contract Documents on each unit, the Contractor shall deliver to the Owner, six (6) keys for each general key-operated device that is provided under these specifications in accordance with ASME A17.1, Part 8 standards as may be adopted and modified by the AHJ.
- 2. All other keying of access or operation of equipment shall be provided in accordance with ASME A17.1 Part 8 as may be adopted and modified by the AHJ.

D. Diagnostic Tools

- 1. Prior to seeking final acceptance of the project, the Contractor shall deliver to the Owner any specialized tools required to perform diagnostic evaluations, adjustments, and/or programming changes on any microprocessor-based control equipment installed by the Contractor. All such tools shall become the property of the Owner.
 - a. Owner's diagnostic tools shall be configured to perform all levels of diagnostics, systems adjustment and software program changes which are available to the Contractor.
 - b. Owner's diagnostic tools that require periodic re-calibration and/or re-initiation shall be performed by the Contractor at no additional cost to the Owner for a period equal to the term of the maintenance agreement from the date of final acceptance of the project.
 - c. The Contractor shall provide a temporary replacement, at no additional cost to the Owner, during those intervals in which the Owner might find it necessary to surrender a diagnostic tool for re-calibration, re-initiation or repair.
- 2. Contractor shall deliver to the Owner, printed instructions, access codes, passwords or other proprietary information necessary to interface with the microprocessor-control equipment.

E. Wiring Diagrams, Operating Manuals and Maintenance Data

- 1. Comply with the requirements of Division 01.
- 2. Deliver to the Owner, four (4) identical volumes of printed information organized into neatly bound manuals prior to seeking final acceptance of the project.

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3. The manuals shall also be submitted in electronic format on non-volatile media, incorporating raw 'CAD' and/or Acrobat 'PDF' file formats.
4. Manuals, as well as electronic copies, shall contain the following:
 - a. Step-by-step adjusting, programming and troubleshooting procedures that pertain to the solid-state microprocessor-control and motor drive equipment.
 - b. Passwords or identification codes required to gain access to each software program in order to perform diagnostics or program changes.
 - c. A composite listing of the individual settings chosen for variable software parameters stored in the software programs of both the motion and dispatch controllers.
 - d. Method of control and operation.
5. Provide four (4) sets of "AS INSTALLED" straight-line wiring diagrams in both hard and electronic format in accordance with the following requirements:
 - a. Displaying name and symbol of each relay, switch or other electrical component utilized including identification of each wiring terminal.
 - b. Electrical circuits depicted shall include all those which are hard wired in both the machine room and hoistway.
 - c. Supplemental wiring changes performed in the field shall be incorporated into the diagrams in order to accurately replicate the completed installation.
6. Furnish four (4) bound instructions and recommendations for maintenance, with special reference to lubrication and lubricants.
7. Manuals or photographs showing controller repair parts with part numbers listed.

F. Patents

1. Patent licenses which may be required to perform work specified by the Contract Documents shall be obtained by the Contractor at its own expense.
2. The Contractor agrees to defend and save harmless the Owner, Consultant and agents, servants, and employees thereof from any liability resulting from the manufacture or use of any patented invention, process or article of appliance in performing work specified in the Contract Documents.

1.3 QUALITY ASSURANCE

A. Qualifications

1. The work shall be performed by a company specialized in the business of manufacturing, installing and servicing conveying systems of the type and character required by these specifications with a minimum of ten (10) years' experience.
2. Prior written acceptance is required for manufacturers other than those listed, before quoting this project. Requests for acceptance will not be considered unless they are submitted before bid date and are accompanied by the following information:

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- a. List of five (5) similar installations having exact equipment being proposed for this project arranged to show name of project, system description and date of completed installation. The list shall include the names, position and resumes of the construction team and field supervisor of the installations.
- b. Complete literature, performance and technical data describing the proposed equipment. Include the names, position and resumes of the proposed construction team and field supervisor.
- c. List of ten (10) service accounts by building name, building manager or owner, including phone numbers.
- d. Location of closest service office from which conveying system will be maintained.
- e. Location of closest parts inventory for this installation.
- f. List of the names, positions and resumes of the construction teams and field supervisor for the installation.

B. Structural, Mechanical and Electrical Design Parameters

1. The mechanical and electrical systems and the building structure have been designed for the following design loads: TBD by Elevator provider.
2. Submit a written statement with the bid that the design loads and the clearance requirements shown on the Architectural drawings are acceptable for the proposed equipment. If not, specifically state the design variances.
After the award, if the type of equipment provided requires structure, mechanical and electrical system changes and/or revisions, the Elevator Contractor shall be responsible for all additional design and construction costs.
3. Electrical equipment, motors, controllers, etc., installed under this contract shall have necessary CSA/US or UL listing as may be required by the AHJ. Equipment shall be labeled or tagged accordingly.

1.4 DELIVERY / STORAGE / HANDLING / COORDINATION

A. Delivery and Storage of Material and Tools

1. Comply with the requirements of Division 01.
2. Delivery, Storage and Handling:
 - a. Deliver materials to the site ready for use in the accepted manufacturer's original and unopened containers and packaging, bearing labels as to type of material, brand name and manufacturer's name. Delivered materials shall be identical to accepted samples.
 - b. Store materials under cover in a dry and clean location, off the ground.
 - c. Remove delivered materials which are damaged or otherwise not suitable for installation from the job site and replace with acceptable materials.
3. The Owner shall bear no responsibility for the materials, equipment or tools of the Contractor and shall not be liable for any loss thereof or damage thereto.

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4. The Contractor shall confine storage of materials on the job site to the limits and locations designated by the Owner and shall not unnecessarily encumber the premises or overload any portion with materials to a greater extent than the structural design load of the Facility.

B. Work With Other Trades / Coordination

1. Coordinate installation of sleeves, block outs, equipment with integral anchors, and other items that are embedded in concrete or masonry for the applicable equipment. Furnish templates, sleeves, equipment with integral anchors, and installation instructions and deliver to Project site in time for installation.
2. Coordinate sequence of installation with other work to avoid delaying the Work.
3. Coordinate locations and dimensions of other work relating to the equipment scheduled for installation including pit ladders, sumps, and floor drains in pits; entrance subsills; electrical service, electrical outlets, lights, and switches in pits and machine rooms.

1.5 WARRANTY / MAINTENANCE SERVICES

A. Contract Close-Out, Guarantee and Warranties

1. Comply with the requirements of Division 01.
2. Guarantee and Warranties:
 - a. Warrant the equipment installed under these specifications against defects in material and quality of installation and correct any defects not due to ordinary wear and tear or improper use of car which may develop within one year from the date each elevator is completed and placed in permanent operation and accepted by the Owner.
 - b. This warrantee shall be written and issued at the completion of each unit prior to final payment.

B. Maintenance:

1. Interim Maintenance: Provide full protective maintenance on the units that are completed and accepted by the AHJ and that may be put in service prior to the overall project completion. The maintenance service shall be as hereinafter specified under the Full Protective Maintenance Service in "3" below and include all code mandated safety and local law tests and inspections that may come due while on this service.
 - a. The price quoted shall be on a per unit per month basis.
2. Warranty Maintenance: Provide full protective maintenance on the specified equipment for a period of twelve (12) months from the date of final acceptance of the entire installation as specified under the Full Protective Maintenance Service in "3" below.
 - a. The price for this service shall be included in the base price or as otherwise specified in the contract documents.

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3. Full Protective Maintenance Service: Submit a separate price for a Full Protective Maintenance Service for the specified units based on a five (5) year contract. The price shall be submitted on the company's own form but shall include all requirements as specified hereinafter. Note: All maintenance shall comply with Part 8 of the ASME A17.1 Code and modified or amended by the Authority Having Jurisdiction.
 - a. Maintenance work shall be performed by trained personnel directly employed and supervised by the service contractor.
 - b. Perform scheduled maintenance work and repairs during the regular working hours of regular working days of the trade. All work shall be coordinated with the Building Manager.
4. Provide emergency callback service and repair twenty-four (24) hours a day, seven (7) days a week, including holidays, between regular examinations at no extra cost to the Owner. The response time during working hours shall not exceed one hour. Perform emergency repairs within four (4) hours to restore the equipment to operating order. The following conditions will require emergency callback services for elevators:
 - a. Passenger entrapment.
 - b. Failure or malfunction of control system.
 - c. Shutdown of any elevator.
5. Maintenance shall include monthly examination, adjustment, lubrication, repair or replacement of electrical and mechanical parts of all equipment and apparatus.
6. The maintenance services shall also cover relamping of machine room and pit lighting fixtures, signal and operating fixtures, communication system, cab ventilation system, monitoring and control panels. The disconnect means, fuses, car enclosures, car doors and hoistway entrances are excluded. Repair equipment whenever required and use only genuine standard parts produced and manufactured for equipment concerned.
 - a. Include a minimum of two (2) hours of monthly labor per unit for the specified scheduled preventive maintenance service.
 - b. Tests: Provide all code mandated safety, local law, firefighter and emergency power tests and inspections including filing and associated fees. There will be two (2) emergency power tests which shall be conducted after work hours at no extra cost to the Owner.
 - c. One (1) month prior to the warranty expiration period, perform a Performance and Maintenance survey of all devices covered under the agreement and submit a report listing the recorded performance data, the emergency call-back services rendered during the year, and recommendations to further improve reliability and performance.
 - 1) When requested, provide a reading of the car's acceleration, deceleration and jerk rates along with a 3-day recording of average corridor call wait times from 7 a.m. to 6 p.m. as recorded on a specified Tuesday, Wednesday and Thursday.

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- d. During every scheduled maintenance visit, make sure the machine room and pit areas are clean.
 - 1) Paint the machine room floor and machine room equipment every three (3) years.
 - e. Adjust controls and maintain the equipment to meet the performance requirements as hereinafter specified.
 - f. If overtime repairs and maintenance services are requested and pre-approved by the Owner, the Contractor shall pay for the regular labor portion, and the Owner will cover the premium portion of the labor only.
 - g. Keep permanent record of inspections, maintenance services including lubrication procedures, emergency call-back services, repairs and replacements.
 - h. Maintain a complete set of updated wiring diagrams and schematic control diagrams in the machine room and provide the Owner with an additional record set.
- 7. Supply all necessary lubricants, cleaning materials and repair parts required to keep the system in good working order during maintenance periods.
 - 8. Maintain an adequate stock of spare parts for maintenance or repair work and minor callback service repairs within the confines of the building in areas designated and assigned by the Owner. Maintain a catalog of spare parts available on site.
 - 9. Additional parts of other equipment required for maintenance and repair of the systems may be stored at the Contractor's facilities with the understanding delivery of same for emergency procedures must be made within two (2) hours to the job site.
 - 10. Other materials and equipment normally not stocked by the Trade Contractor locally must be available within twenty-four (24) hours for delivery to the job site from remote facilities and/or Supplier Contractors responsible to the Contractor for stocking the materials or equipment.
 - 11. If the requirements for stockade of parts as defined herein are not met on any item, immediately notify the Owner in writing as to the circumstances and provide a confirmed delivery date for the required materials and equipment.
 - 12. Should it become necessary to work on the equipment, proper safety barricades shall be erected to protect people from all hazards.
 - 13. If for any reason (such as strike), it is mutually agreed to temporarily reduce the level of maintenance, the monthly amount of the maintenance contract shall be reduced to reflect the reduction in maintenance services.
 - 14. Should the Owner request that the maintenance Contractor perform any work on the equipment of this Contract, but not included in the terms of the Contract, then payment for such work shall be based on the rates included in the Contract for time and material.
 - 15. Thirty (30) days before the annual renewal of this agreement, adjust monthly maintenance price as follows:
 - a. Eighty percent (80%) of the current maintenance price based on current straight-time hourly rate for a mechanic.
 - b. Twenty percent (20%) of the current maintenance price based on the established difference in the "Producer Commodity Prices for Wholesale Metals and Metal Products Index".

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- c. Notwithstanding anything to the contrary, the maximum annual increase shall not be more than three percent (3.0%) of the total contracted payment for the preceding contract year.
16. Cancellation: The Owner has the right to cancel this contract on 30 days' notice.
17. Obtain the following minimum insurance coverage:
 - a. Commercial General Liability Insurance on an Occurrence basis including:
 - 1) Bodily Injury, Property Damage including Personal Injury and death.
 - 2) "Per Project" endorsement.
 - 3) Broad form property damage liability.
 - 4) Blanket Contractual Liability including contractual liability assumed by this contract.
 - 5) Independent Contractors Protective Liability coverage. The minimum limit for Comprehensive Liability insurance coverage shall be:
 - a) Each Occurrence: \$1,000,000
 - General Aggregate: \$2,000,000 including "Per Project" endorsement Products & Completed Operations Aggregate: \$1,000,000
 - b) Excess liability limits of not less than:
 - Each Occurrence: \$4,000,000
 - Coverage to follow form of underlying policies.
 - 6) Worker's Compensation Insurance – In accordance with the statutory limits.
 - 7) Employer's Liability Insurance – With a minimum limit of not less than:
 - a) Bodily Injury by Accident: \$1,000,000 each accident
 - b) Bodily Injury by Disease: \$1,000,000 each employee
 - c) Bodily Injury by Disease: \$1,000,000 policy limit
 - 8) Statutory State Disability Benefits Insurance covering all persons employed by the Contractor in connection with this contract.
 - b. The foregoing insurance policies shall be primary to any other insurance which may be carried by the Owner or Owner's Agent and shall name the Owner, the Owner's Agent and the Consultant as additional insured with a specific policy endorsement as follows: Gordon Johnson Architecture and VDA (Van Deusen & Associates)
 - c. Certificates of Insurance evidencing such coverage shall be filed with the Owner's Agent prior to the commencement of the contract and all renewals of insurance certificates shall be furnished prior to the expiration of any coverage herein.
 - d. The policies shall contain a provision giving Owner and Owner's Agent thirty (30) days, or any longer period prescribed by North Carolina Insurance Law, prior written notice of any change or cancellation of such insurance, in the event of cancellation

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- of Non Payment of Premium, in which ten (10) day notice will be provided. This notice shall be included on the Certificate of Insurance.
- e. All insurance must be with a licensed and admitted insurance carrier maintaining no less than an A.M. Best's rating of "A" or better, shall be size VII, and shall be subject to acceptance by Owner's Agent in its sole discretion.
 - f. The Contractor agrees that the required insurance is not intended to limit the Contractor's liability in the event that Contractor is deemed to be negligent in causing bodily injury or property damage during the course of its operation.
 - g. The Contractor shall, at its own expense, maintain physical damage insurance in the amounts and against the perils desired by the Contractor on all property of any kind owned or rented by the Contractor. The Contractor hereby waives its rights of recovery against the owner for any damage or loss to property of any kind which is owned or rented by Contractor or for which the Contractor is liable.
 - h. The Purchaser/Owner may have the Contractor's work and systems' performance operation checked monthly to ensure the Contractor is performing in accordance with this Contract. If the work requirements are not maintained, the Purchaser/Owner will retain the monthly payment to the Contractor until the Consultant verifies that the work and/or operating performance is back to standard. If three (3) consecutive months of substandard maintenance is noted, the Owner has the right to immediately cancel the Contract without notice to the Contractor.
 - 1) The Consultant, Purchaser and/or Owner's Designee may withhold approval for payment on any request to such extent as may be necessary to protect the Owner from loss on account of:
 - a) Negligence on the part of the Contractor to execute the work properly or failure to perform any provisions of the contract, The Owner, after three (3) days written notice to the Contractor, may, without prejudice to any other remedy make good such deficiencies and may deduct the cost of the contract.
 - b) Claims filed or reasonable evidence indicating probable filing of claims due to the Contractor's failure to perform.
 - c) Failure of Contractor to make payments properly to subcontractor for material and labor used to fulfill contractual requirements.
 - d) Damage to the building as a result of work performed or another subcontractor's failure to perform.
 - i. Maintain the elevators to insure there are no more than six (6) shutdowns per elevator, per year. A shutdown will be classified as an elevator being out of service (for other than maintenance purposes) for more than four (4) hours. Note: If a car is out of service for 12 hours, it will be recorded as three (3) shutdowns.
 - j. Unit shutdowns will be evaluated on a quarterly basis prior to payment. If the total number of shutdowns exceeds the annualized rate, there will be a \$500 per shutdown deduction from the payment.
 - 1) If a unit is out of service for more than 72 consecutive hours, except for a scheduled repair that exceeds this time limit, billing for that unit

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shall be suspended until the unit is placed in operation.

- k. Contractor shall notify Purchaser and Consultant in writing regarding any necessary services, coverage or times which may have been omitted from the maintenance contract specifications and any irregularities, discrepancies or duplications that could affect the full comprehensive intent of the agreement.
 - 1) Any duplication of work or coverage is specified as a means of demonstrating the contract requirements, but such duplication, if any, is not intended to expand coverage or increase requirements for such work or services and such duplication shall not increase costs or provide justification for extra or additional charge to the Purchaser.

PART 2 - PRODUCTS

2.1 GENERAL DESCRIPTION

A. Elevator Service Concourse "B" (Alternate G1)		
1.	Quantity	One (1)
2.	Type	Hole-less Hydraulic/Service
3.	Capacity (lbs)	4500 lb. (Class "A" loading)
4.	Speed (fpm)	125 FPM
5.	Travel in Feet	15'-4" +/-
6.	Number of Landings	Two (2)
7.	Number of Openings	Two (2)
8.	Front Openings	Two (2)
9.	Rear Opening	None
10.	Operation	Simplex collective
11.	Control	Variable voltage variable frequency
12.	Fireman's Control	Phase I and II
13.	Number of Push Button Risers	One (1)
14.	Platform Size	5'-8" wide x 7'-9 1/2" deep
15.	Guide Rails	Steel tees, provide rail backing as required
16.	Buffers	Springs
17.	Car Door Size	4'-0" wide x 7'-0" high
18.	Hoistway Door Size	Same as car door
19.	Door Operation	Dual speed side opening
20.	Machine Type	Hydraulic
21.	Power Supply	480-3-60
22.	CCTV and Card Reader	By Others
23.	CCTV and Reader Cable	Required
24.	PA Speaker	By Others
25.	PA Cable	Required
26.	Entrances	Stainless steel unit frames w/No. 4 finish at Main
27.	Landing Fixture	
	a. Typical Landings	Standard
	b. Lobby Landing	Standard

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28.	Sills	Extruded aluminum
29.	Car and Landing Call Buttons	Round stainless steel with concealed fasteners and LED lights.
30.	Car Operating Fixtures	Car operating panel in swing front return, cast metal designation markings, flush stud mounted. LED car position indicators.
31.	Communication	Phone
32.	Door Protective Device	Infrared light curtain type.
33.	Emergency Light Fixture	Two cab light fixtures will be arranged to operate as an emergency light fixture for at least 2 hours.
34.	Car Fan	Two speed fan to provide at least 1.0 air changes per minute at low speed and 1.5 air changes per minute at high speed
35.	Cab Enclosure	As specified

B. Elevator Service Main Terminal (new shaft and unit)

1.	Quantity	One (1)
2.	Type	Hole-less Hydraulic/Service
3.	Capacity (lbs)	5000 lb. (Class "A" loading)
4.	Speed (fpm)	125 FPM
5.	Travel in Feet	15'-4" +/-
6.	Number of Landings	Two (2)
7.	Number of Openings	Two (2)
8.	Front Openings	Two (2)
9.	Rear Opening	None
10.	Operation	Simplex collective
11.	Control	Variable voltage variable frequency
12.	Fireman's Control	Phase I and II
13.	Number of Push Button Risers	One (1)
14.	Platform Size	5'-8" wide x 8'-5" deep
15.	Guide Rails	Steel tees, provide rail backing as required
16.	Buffers	Springs
17.	Car Door Size	4'-0" wide x 7'-0" high
18.	Hoistway Door Size	Same as car door
19.	Door Operation	Dual speed side opening
20.	Machine Type	Hydraulic
21.	Power Supply	480-3-60
22.	CCTV and Card Reader	By Others
23.	CCTV and Reader Cable	Required
24.	PA Speaker	By Others
25.	PA Cable	Required
26.	Entrances	Stainless steel unit frames w/No. 4 finish at Main
27.	Landing Fixture	
	a. Typical Landings	Standard
	b. Lobby Landing	Standard

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28.	Sills	Extruded aluminum
29.	Car and Landing Call Buttons	Round stainless steel with concealed fasteners and LED lights.
30.	Car Operating Fixtures	Car operating panel in swing front return, cast metal designation markings, flush stud mounted. LED car position indicators.
31.	Communication	Phone
32.	Door Protective Device	Infrared light curtain type.
33.	Emergency Light Fixture	Two cab light fixtures will be arranged to operate as an emergency light fixture for at least 2 hours.
34.	Car Fan	Two speed fan to provide at least 1.0 air changes per minute at low speed and 1.5 air changes per minute at high speed
35.	Cab Enclosure	As specified
-
- C. Elevator Service Main Terminal (replacement unit in existing shaft)
- | | | |
|-----|------------------------------|---|
| 1. | Quantity | One (1) |
| 2. | Type | Hole-less Hydraulic/Service |
| 3. | Capacity (lbs) | 2100 lb. (Class "C" loading) |
| 4. | Speed (fpm) | 110 FPM |
| 5. | Travel in Feet | 15'-4" +/- |
| 6. | Number of Landings | Two (2) |
| 7. | Number of Openings | Two (2) |
| 8. | Front Openings | Two (2) |
| 9. | Rear Opening | One (1) |
| 10. | Operation | Simplex collective |
| 11. | Control | Variable voltage variable frequency |
| 12. | Fireman's Control | Phase I and II |
| 13. | Number of Push Button Risers | One (1) |
| 14. | Platform Size | 5'-8" wide x 4'-3" deep |
| 15. | Guide Rails | Steel tees, provide rail backing as required |
| 16. | Buffers | Springs |
| 17. | Car Door Size | 3'-0" wide x 7'-0" high |
| 18. | Hoistway Door Size | Same as car door |
| 19. | Door Operation | Single speed side opening |
| 20. | Machine Type | Hydraulic |
| 21. | Power Supply | 480-3-60 |
| 22. | CCTV and Card Reader | By Others |
| 23. | CCTV and Reader Cable | Required |
| 24. | PA Speaker | By Others |
| 25. | PA Cable | Required |
| 26. | Entrances | Stainless steel unit frames w/No. 4 finish at Main. Shaft frames are existing to remain |
| 27. | Landing Fixture | |
| | a. Typical Landings | Standard |
| | b. Lobby Landing | Standard |
| 28. | Sills | Extruded aluminum |

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29.	Car and Landing Call Buttons	Round stainless steel with concealed fasteners and LED lights.
30.	Car Operating Fixtures	Car operating panel in swing front return, cast metal designation markings, flush stud mounted. LED car position indicators.
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34.	Car Fan	Two speed fan to provide at least 1.0 air changes per minute at low speed and 1.5 air changes per minute at high speed
35.	Cab Enclosure	As specified

2.2 MANUFACTURERS

A. Pre-Approved Equipment Manufacturers

1. Otis, Schindler, TKE
2. In addition to Original Equipment Manufacturers, the following manufacturer's equipment and materials have been pre-approved for use on this project.
3. Other manufacturers/products not specifically mentioned below shall be considered for approval on an individual basis.
 - a. Controller - GAL (GALaxy), Motion Control Engineering, Elevator Controls Corporation, Elevator Systems, Inc.
 - b. Tracks, Hangers, Interlocks and Door Operators - G.A.L., ECI.
 - c. Fixtures - G.A.L., Adams, EPCO, Monitor, E-Motive USA, C.E. Electronics, Innovation, MAD, National.
 - d. Door Protective Device - Janus, Adams, G.A.L., T.L. Jones, Tri-Tronics.
 - e. Cabs and Entrances -EDI/ECI, National Cab & Door, Tyler, Velis, Gunderlin, Eklund, EMCO.
 - f. Motors - Imperial Electric, General Electric, Baldor, Reuland Electric.
 - g. Guide Rails - Savera, Monteferro.
 - h. Electrical Traveling Cables – Draka, James Monroe
 - i. Guide Shoes/Slide – ELSCO, G.A.L.
 - j. Intercommunications/Telephones - Webb Electronics, K-Tec, Ring, Wurtec, Janus, approved equal.
4. Original Equipment Manufacturers may substitute their own branded equipment subject to the following:
 - a. All requirements of the specifications are met regarding performance, appearance, serviceability and support.
 - b. A full stock of all regular and critical replacement parts required for this project are maintained at a facility within fifty (50) miles of the project site.

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- 1) Any parts not stocked at the above referenced facility shall be identified with the location of the nearest source and shall be available for next-day delivery upon demand.
- c. All parts and software shall be made available for purchase to a qualified elevator maintenance firm within one-business day delivery without direct Owner involvement.
 - 1) Provide details of parts supply facility and a list of current parts pricing for all major components required for the installation.
- d. All specialized tools, equipment, software, and passwords, required to maintain, repair, adjust the operation, and perform code mandated inspections are provided to the Owner as part of the base installation.
 - 1) Updates to these items shall be available via the parts supply facility referenced above.
- e. Technical support of the product(s) shall be available to the Owner's elevator service provider.

2.3 CONTROL FEATURES / OPERATION

A. Simplex Selective Collective Operation – All Elevators

1. Provide simplex selective collective operation from a riser of hall push button stations.
2. The registration of one or more car calls shall dispatch the car to the designated floors. The car shall also respond to registered hall calls in the same direction of travel. Car and hall calls shall be canceled when answered.
3. Stops in response to calls that are registered in either the car or corridor pushbutton stations shall occur in the natural order of progression in which the floors are encountered, depending on the direction of car travel, and irrespective of the order in which calls are registered.
4. When the car has responded to the highest or lowest call, and calls are registered for the opposite direction, the car shall reverse direction automatically and respond to those registered calls.
5. When the car arrives at its last stop and reverses direction of travel, all previously registered car calls shall be automatically cancelled.
6. When the car has responded to the highest or lowest call, and hall calls are registered for the opposite direction, the car shall reverse direction automatically and respond to those registered calls.
7. When the car arrives at a landing where both up and down hall calls are registered, it will answer the call in the direction of travel.
 - a. After a pre-determined delay, if no car call is registered, the car shall be assigned to respond to calls registered for the opposite direction. Car doors shall close immediately, re-open and respond to the call for the opposite direction.
 - b. Hall lantern operation shall always correspond to direction of service.

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8. When an empty car reverses direction at a landing with no hall calls, the doors shall not open and the hall lantern shall not operate.
9. If the car has no car calls registered and arrives at a floor where both up and down hall calls have been registered, the car shall respond to the hall call corresponding to the direction of car travel. If, after making its stop, a car call is not registered and no other hall calls exist ahead of the car corresponding to its original direction of travel, the doors shall close and immediately reopen in response to the hall call for the opposite direction.
10. The car shall maintain its original direction at each stop until the doors are fully closed to permit a passenger to register a car call before the car reverses its direction of travel.

B. Motion Control

1. Smooth step-less acceleration and deceleration of the elevator car shall be provided in either direction of travel during both single and multiple floor runs.
 - a. The maximum velocity which the elevator achieves in either direction of travel while operating under load conditions that vary between empty car and full rated load shall be within $\pm 10\%$ of the rated speed.
2. Floor leveling accuracy of $\pm 1/4"$ as measured between the car entrance threshold and the landing sill on any given floor shall be provided.
 - a. This accuracy standard shall be maintained under varying load conditions and without need for releveling corrections caused by overshooting or stopping short of the floor.
3. Elapsed flight time during a typical elevator one floor run shall not exceed values as further specified.
 - a. Timing, as measured between the moment door closing operations begin and when the doors are $3/4$ open at the next adjacent floor, shall remain consistent under varying load conditions in either direction of travel.

C. Low Oil Protection and Protective Device

1. Provide low oil protection operation and appropriate device(s) that will discontinue operation of the hydraulic elevator pump when:
 - a. The elevator stalls due to a low oil condition
 - b. Fails to reach the landing in the up direction
2. Pressure Switch:
 - a. Where the top of the cylinder head is above the top of the tank, provide a pressure switch between the cylinder and the valve which shall be activated by the loss of pressure at the top of the cylinder, and control the operation of the elevator as required by Code.
3. Provide an additional protective device that shall automatically return the elevator to the

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- bottom landing, open the door and shut down the system.
- 4. The protective device shall be an integral part of the control system.

D. Hydraulic Auto Lowering

- 1. Provide automatic battery powered lowering feature for the hydraulic elevator.
 - a. In the case of normal power outage, the elevator shall be automatically lowered to the Main Lobby level.
 - b. The door shall open automatically to discharge passengers.
 - c. The elevator shall remain parked with its door closed and door open button operative until normal power is restored.
- 2. The control panel shall be located in the machine room or be an integral part of the control system.
 - a. It shall include necessary batteries, solid-state controls, charger, monitor lights and a test button.
 - b. It shall be fed by a 120 volt, 20 Ampere branch circuit from the emergency power source, provided by others.
- 3. Provide necessary circuitry within the controller to determine the difference between an “intentional” loss of power and an “actual” loss of power in order to prevent operation of the auto lowering unit when the main line disconnect has been opened for elevator servicing.
- 4. Provide necessary terminals for connection to an auxiliary switch in main line disconnect provided by others.
 - a. Install an oil-hydraulic muffler in oil line near power unit.
 - 1) The mufflers contain pulsation absorbing material inserted in a blow-out proof housing.
 - 2) Rubber hose without blow-out proof features will not be acceptable.
 - b. Provide sound reducing vibration isolation elements at all support points of elevator controllers and pump units.
 - 1) The elements shall be similar to double deflection neoprene-in-shear mounts, as manufactured by Mason Industries.
 - 2) All bolts through isolation elements, where necessary, are to incorporate resilient washers and bushings.
 - c. Locate the power unit at least 1" from any walls.

E. Use flexible conduit with ground wire for pump unit connections.

F. Independent Service Operation

- 1. The car operating station shall be equipped with a key-operated switch labeled “IND SER”.

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2. Locate the switch with other switches on the surface of the car operating panel. When placed in the “on” position the following shall occur:
 - a. Existing hall call registrations shall extinguish and hall buttons shall remain inoperative as an indication to passengers that there is no elevator service.
3. During Independent Service Operation, the elevator doors shall remain open at any landing until the door close or car call registration pushbutton, is pressed and maintained until the doors are fully closed.
4. If more than one (1) car call is registered, all registered car calls shall extinguish when the elevator stops in response to the first call.
5. In case an elevator is operating on the Independent Service mode and the Fire Emergency Recall system becomes activated, the elevator shall automatically override Independent Service Operation and engage Phase I - Fire Emergency Recall Operation following a period of approximately forty-five (45) seconds.

G. Inspection Service Operation

1. Provide a key operated switch in the main car operating panel that, when turned to the ‘ON’ position, shall cause the elevator to be removed from service and placed in Inspection Service Operation.
2. Limited operation of the car shall be provided through pressing the Attendant Service up and down momentary push buttons (if provided) or the highest or lowest car call push buttons (if up and down buttons are not provided) in the main car operating panel only.
3. The car shall move at a speed not to exceed 150 feet per minute (0.75 meters per second) as per code with both the hall and car door panels in the closed and locked position.
4. The Inspection Service switch shall be keyed differently than other typical keys used in the operation of the elevator. Keying shall be in accordance with Security Group Classifications as required by applicable code.
5. The top of the elevator car shall be equipped with a control for limited operation of the car during repairs, maintenance and inspection conducted in the hoistway. The transfer of control to the top of car operating device shall cause that device to be the sole means of control for the elevator.
6. Power door operating equipment shall be rendered inoperative while the car is being operated in the Inspection Service mode with the exception of power closing of the door. The control system shall maintain closing power on the door while the elevator is moving under Inspection Service Operation.
7. The in-car Inspection Service switch shall be rendered ineffective when the top of car inspection control is activated.
8. Machine Room Inspection Operation and Inspection Operation with open door circuits shall be provided in accordance with A17.1 Safety Code where required or allowed by the AHJ.

H. Hoistway Access Operation

1. Provisions shall be made to allow access to the hoistway through the use of hoistway access switches.
2. Operating the access switch shall permit the car to move at a speed not to exceed 150 feet

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per minute (0.75 meters per second) as per code with the hall and car doors in the open position to obtain access to the top of the car.

3. The car shall automatically stop motion when the car top is level with the hoistway door sill.
4. The access key switch(es) shall be keyed differently than other typical keys used in the operation of the elevator. Keying shall be in accordance with Security Group Classifications as required by applicable code.
5. Access operation shall be disabled when top of car inspection operation is in effect.

I. Fire Emergency Operation

1. Firefighters Service Operation and devices shall meet applicable code requirements of the AHJ.
2. Contractor shall be responsible for compliance in all aspects of Firefighters Service including, but not limited to the mode of operation, initiation of operation, operating/control and signaling devices as well as fixture engraving including operating instructions applicable to and where required by the specific Jurisdiction.

J. Emergency Power Operation (If provided) / All Elevators Operational

1. Upon loss of normal power, and establishing of emergency power, all elevators shall automatically resume normal operation.
 - a. Elevators shall start sequentially so as to prevent overloading of the emergency power system.
2. An illuminated signal marked “ELEVATOR EMERGENCY POWER” shall be provided in the elevator lobby at the designated level to indicate that the normal power supply has failed and the emergency power is in effect.
3. Prior to return to normal power, the building ATS shall provide a “pre-transfer” signal to the elevator equipment that will initiate the landing of elevators prior to transfer from emergency power to normal power.
 - a. Timer of the pre-transfer signal shall be adjustable from 15 to 30 seconds.
4. The following additional requirements apply:
 - a. Firemen’s Service Operation will remain active at all times during emergency power operation.
 - b. All car lighting will remain active with car lighting on separate “emergency power feeders” and additional battery back-up.
 - c. Communications will remain active all times via emergency power source feeder and additional battery back-up.
 - d. Remote monitoring, where provided, will be active from each dispatcher for selected elevators using an uninterrupted power supply (UPS) to maintain the central processing unit during power transfers.
 - e. Position indicator for each elevator will be active in the selected elevator and security room (where applicable), as well as Lobby display panels.

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5. Testing of elevators under emergency power shall be accomplished with the building ATS providing a “pre-test” signal to the elevator control apparatus.
 - a. The pre-test signal shall initiate the landing of the elevators prior to the transfer from normal to emergency power.
 - b. After testing, the building ATS shall provide a “pre-transfer” signal to land the elevators prior to the transfer from emergency to normal power.
6. Monitoring of Elevator Duress Alarm Buttons
 - a. The security system shall provide auxiliary monitoring of the duress alarm buttons in each elevator.
 - b. Activation of an elevator duress alarm button shall cause an alarm indication on the security system operator’s terminal.
 - c. To provide for monitoring of the elevator duress alarm button, provide a pair of terminals per elevator such that when the duress button is activated, a normally closed dry contact across those terminals shall open and remain open for as long as the duress button is activated.
7. CCTV Camera Surveillance of Elevators
 - a. A camera shall be installed in a corner-mounted housing in the ceiling of the cab in a flush mounted housing, to provide for camera surveillance of all elevators.
8. Firemen’s Override
 - a. Firemen’s override and automatic recall functions shall bypass all security elevator control functions.
9. System Interface
 - a. Provide a terminal cabinet in each elevator machine room for elevator / security system interface. The terminal cabinet shall contain all terminals required to interface the elevators located in the machine room to the security system. (If provided)
10. Submittals
 - a. Submit product specifications, fabrication shop drawings, and wiring diagrams of the following:
 - 1) Elevator / Security interface terminal cabinet.
 - 2) Card reader installation.
 - 3) CCTV camera installation.
 - 4) Keyswitch installation.
 - 5) Traveling Cables.
11. Interface Terminal Cabinet

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- a. The interface terminal cabinet shall be a lockable continuous hinge cover NEMA Type 1 enclosure.
- b. The cover of the enclosure shall be labeled to identify its function.
- c. Dual screw barrier type terminal strips shall be provided within the interface terminal cabinet.
 - 1) Terminals shall be provided for each interface point.
 - 2) All terminals shall be labeled to identify their function.

12. Traveling Cable

- a. The card reader interface traveling cable shall be one (1), twelve (12) conductor 20 gauge stranded, low voltage cable with an overall braided shield and drain wire.
- b. The CCTV camera interface traveling cable shall be two (2), RG-59U stranded center conductor coax cables and one (1), two (2) conductor 20 gauge stranded, low voltage cable with an overall braided shield and drain wire.
- c. All security interface traveling cables shall be located in the elevator control traveling cable and shall be isolated from other traveling cables used to carry high voltage alternating current circuits.

13. Interface Terminal Cabinet Installation

- a. Install the interface terminal cabinet within the elevator machine room in a readily accessible location no more than 6'-0" AFF.
- b. Provide any control logic and relays that will be required to interface the elevator control system to the dry contact closures (rated for 1 AMP at 24 VDC) provided by the security system.
- c. Provide interconnect wiring from the elevator control system to the interface terminal cabinet.
- d. The security contractor shall wire from the security system to the interface terminal cabinet.

14. Card Reader and CCTV Camera Installation (If card readers and CCTV are provided)

- a. The card reader and CCTV camera shall be provided by the security contractor and installed by the Elevator Contractor.
 - 1) The security contractor shall provide supervision, wiring details and installation diagrams to the Elevator Contractor.
- b. The exact card reader and CCTV camera locations shall be specified by the Architect.

15. Traveling Cable Installation

- a. Traveling cables for card reader interface shall extend from the elevator / security interface terminal cabinet in the elevator machine room to behind the elevator return panel.
- b. Terminate the cables including the drain wire to dual screw barrier terminal strips in

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the interface cabinet and provide 6 feet of excess cable behind the elevator return panel.

- c. The Elevator Contractor shall be responsible for connecting the cable behind the return panel to the card reader under the direct supervision of the security contractor.
- d. Traveling cables for the CCTV camera shall extend from the elevator / security interface terminal cabinet in the elevator machine room to the top of the elevator cab. Provide an excess loop of 10 feet of cable at each end.

16. Conduit, Power and Wiring

- a. Provide all conduit, power and wiring required for the installation of the terminal cabinet, traveling cables and interfacing to the elevator control system.
- b. Provide one (1) 120V duplex un-switched outlet dedicated to security on top of each elevator equipped with CCTV camera.
- c. The security contractor shall provide all wiring from the interface terminal cabinet to the security system.

17. Automatic Bypass of Card Reader Control of Elevators (If card readers are provided)

- a. The card reader control of elevators shall be automatically bypassed by the security system upon a fire alarm condition.
- b. To provide for automatic bypass, the fire alarm contractor shall provide a normally closed dry output contact from the fire alarm system.
 - 1) Upon a fire alarm condition, the contact shall open the elevator system shall bypass the card reader control of elevators.
 - 2) The contact shall remain open until the fire alarm system is manually reset.

18. System Interface

- a. To provide for interfacing the dry contact output from the fire alarm system to the elevator system. The fire alarm contractor shall provide an interface to the elevator system for card reader controlled Elevators.

K. Door Operation

- 1. Car and hoistway doors shall be arranged to operate in unison without excessive noise or slamming in either direction of travel.
 - a. Door opening speeds of two (2) feet per second shall be provided in conjunction with closing speeds of 1.0 feet per second in accordance with governing code.
 - b. Door operation shall be arranged to commence as the car enters its final leveling approach to a landing. In no case shall the door opening cycle conclude before the car comes to a complete stop at floor level.
- 2. Door open and door close time shall be measured between the moment car door operation in either direction begins and the instant at which that cycle is completed.
- 3. When responding to either a car or corridor call, the amount of time that the elevator door remains stationary in the open position shall be adjustable up to sixty (60) seconds.

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- a. Door open dwell time for a corridor call shall be separate of that for a car call, and in both cases, dwell time shall be canceled whenever the car door protection device is momentarily interrupted by passenger transfers, followed by a reduced door open dwell time of approximately one (1) second (adjustable) after the door protection device is cleared of obstructions.
4. The operation of the door protective device by physical contact (mechanical safety-edge) or the interruption of one or more infrared light beams (dual or multi-beam non-contact) during the close cycle shall cause the immediate reversing of the doors to the full open position.
5. The door closing cycle shall be arranged so that, in the event the door protective devices become continually obstructed after the normal door open dwell time has expired, and following a time interval of approximately thirty (30) seconds (adjustable), a warning tone shall sound and the door closing cycle shall commence at reduced speed and torque per applicable Code requirements.
6. Each car operating station shall be provided with a “door open” and “door close” push button.
 - a. Pressure on the “door open” button shall cause doors in the full open position to remain so and doors engaged in the close cycle to reverse direction and assume the full open position so long as pressure remains applied to the button.
 - b. The “door open” buttons shall also control the open cycle during Phase II - Emergency In-car Operation.
 - c. The “door close” push button shall function on Independent Service, Attendant Service and Phase II - Emergency In-car Operation as well as during normal automatic operations.
7. Each service car shall be provided with a “door hold” push button.
 - a. Pressure on the “door hold” button shall cause doors in the full open position to remain in the open position and doors operating in the close cycle to reverse direction and travel to the full open position for an extended (adjustable) period of time to allow for loading and unloading.
 - b. The “door hold” feature shall be overridden when the elevator is on Fire Emergency Phase I and Phase II.
 - c. The “door hold” feature shall be cancelled when the “door close” button is pressed.
8. Repeated attempts by the power door operator to open or close the door at any landing shall be monitored by the control system.
 - a. In the event the door fails to cycle properly after a preset (adjustable) number of attempts, the car shall either travel to the next stop or remove itself from service, depending upon whether the malfunction is in the open or close cycle.
9. Each hoistway door shall be provided with an automatic self-closing mechanism arranged so that the door shall close and lock if the car should leave the landing while the hoistway door is unlocked.

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10. Car doors shall be arranged to prevent their being manually opened from inside the car unless the elevator is positioned within a floor landing zone.

2.4 MACHINE ROOM EQUIPMENT

A. Controller

1. The elevators shall have microprocessor based controllers.
2. Digital logic shall calculate optimum acceleration, deceleration and velocity patterns for the car to follow during each run.
3. Closed-loop distance and velocity feedback shall monitor the actual performance of the elevator car with the desired speed profile.
4. System operating software shall be stored in non-volatile memory.
5. Elevator control relays, contactors, switches, capacitors, resistors, fuses, circuit breakers, overload relays, power supplies, electronic circuit boards, microprocessors, wiring terminal blocks and related components shall be totally enclosed inside a free-standing metal cabinet with hinged access doors.
 - a. Provide natural or mechanical ventilation for the controller cabinets.
 - b. Equip the vent openings and exhaust fans with filters.
6. Mount equipment to moisture-resistant, noncombustible panels supported from the steel frame.
7. Provide "noise filter" between hoistway wiring and controller/dispatchers to eliminate interference.
8. Optically isolate communication cables between components.
9. Provide a solid state starter for the pump motor.
10. Wiring: Wiring on the units, whether factory or field wiring, shall be done in neat order, and all connections shall be made to studs and/or terminals by means of grommets, solderless lugs or similar connections. All wiring shall be copper.
11. Terminal Blocks: Provide terminal blocks with identifying studs on units for connection of board wiring and external wiring.
12. Marking: Identifying symbols or letters shall be permanently marked on or adjacent to each device on the unit, and the marking shall be identical with marking used on the wiring diagrams. In addition to the identifying marks, the ampere rating shall be marked adjacent to all fuse holders.
13. The manufacturer's standard on-board "LCD" display shall be incorporated on the main processor board and/or otherwise incorporated in the controller cabinet. The "LCD" shall be capable of providing alpha-numeric characters to view the operational status of the elevator functions depending on the application. The display shall provide the user with necessary information for troubleshooting and reprogramming of the basic system parameters.
 - a. Where the "LCD" is not an integral part of the controller and troubleshooting/reprogramming requires the use of a separate tool, the tool shall be maintained in the machine room and accessible to service personnel. This tool, along with all technical documentation for the correct use of the tool, shall remain the property of the Owner.

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- b. Password protection of critical programming features is required to prevent accidental changes to life-safety and other non-typical control settings.
- 14. In the event diagnostics and monitoring is accomplished via Field Service Tools, provide the required Field Service Tools with related control system appurtenances for diagnostic evaluations, system monitoring and field adjustments.
 - a. Provide instructions for proper use of such diagnostic tools and/or equipment with all coding and other operational requirements.
 - b. Maintain and calibrate the diagnostic tools, and update the associated instructions and other related documents under the service agreement.
 - 1) Should the agreement be cancelled for any reason by either party, maintenance and updating of diagnostic tools shall be provided to the Owner at the Contractor's cost without the need to purchase or lease additional diagnostic devices, special tools or instructions from the original equipment provider.
 - 2) The Owner may request field and technical instructions be provided by the original installation contractor or manufacturer for proper servicing by other qualified elevator company personnel.
 - 3) The established cost plus profit, as previously specified, shall be applicable for the life of the system.
 - a) If the equipment for fault diagnosis is not completely self-contained within the controllers but requires a separate detachable device, that device shall be furnished to the Owner as part of this installation.
 - b) Such device shall be in possession of and become property of the Owner.
- 15. Microprocessor Documentation
 - a. Provide and/or obtain complete information on systems' design, component parts, installation and/or modification procedures, adjusting procedures and associated computer conceptual logic circuitry and field connection.
 - b. Provide microprocessor upgrading and/or modifications to programs that have been assigned to enhance the operation of the equipment for a period of 10 years after project approval.
- B. Hydraulic Pump Motor
 - 1. Provide an alternating current induction motor having a maximum speed of 1800 RPM, designed to operate at 120 starts per-hour and a continuous rated 50 degrees C temperature rise.
- C. Hydraulic Power Unit / Motor
 - 1. Provide a self-contained power unit which includes:
 - a. Structural steel outer base
 - b. Tank support
 - c. Floating inner base to prevent metallic contact for mounting the motor pump assembly.

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- d. Sound isolation panels to enclose the unit and reduce airborne noise.
2. Provide a reinforced overhead oil reservoir with a tight fitting tank over the oil control unit which includes:
 - a. An oil fill strainer with air filter
 - b. An oil level gauge assembly
 - c. A self-cleaning strainer in the suction line.
3. The pump shall be for oil hydraulic elevator service with positive displacement screw type design for steady discharge with minimum vibration.
4. The drive shall be directly driven by a submersible pump depending on the HP requirements of the system.
 - a. The use of submersible pumps having more than a 40 HP motor is unacceptable.
5. Pump drive motor control shall utilize solid state motor starter circuitry to provide reduced current starting and maximum protection of the motor.
6. The oil control unit shall be of the manufacturer's own design but shall include relief, safety check, start and slow down valves.
 - a. Use lowering and leveling valves for drop away speed, lowering speed, leveling speed and stopping speed to insure smooth down starts and stops.
 - b. Provide a valve for manual lowering of the elevator car in event of power failure and for use in servicing and adjusting the elevator mechanism.
 - c. Design the tank shut-off valve for isolating oil in the power unit tank to ensure each of servicing and adjusting the elevator mechanism without removing oil from the tank.
 - d. All valves shall be accessible for adjustment without removing the assembly from the oil line.
7. Manufacture the unit to operate under 600 psi working pressure.
8. Provide the manufacturer's standard oil cooler sized and designed to maintain a maximum oil temperature of 125 degrees F in a machine room conditioned to operate at a maximum ambient temperature of 95 degrees F.

D. Jack Unit

1. Design and construct the jack unit in accordance with the applicable requirements of the ASME Code.
2. The jack shall be of sufficient size to lift the gross load at the rated speed to the height specified and shall be factory tested to ensure adequate strength and freedom from leakage.
3. No brittle material, such as gray cast iron, shall be used in the jack construction.
4. The jack unit shall consist of:
 - a. A plunger of heavy seamless steel tubing turned smooth and true to ± 0.15 inches tolerance, and with no diameter change greater than .04 inches per foot of length.
 - b. A stop ring electrically welded to the plunger to prevent plunger leaving its cylinder.
 - c. Internal guide bearing.
 - d. Cylinder head with removable packing gland to facilitate replacement of packing.
 - e. A drip ring below cylinder head to collect oil.
 - f. A bleeder valve to release gases from the system.
5. Install both jacks plumb and attach them to heavy-duty clamps to guide rail brackets and/or to building structure.

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E. Hydraulic Piping

1. Provide all necessary pipes and fittings to connect the power unit to the jack.
 - a. Use minimum Schedule 80 steel pipe.
 - b. Provide a shut off valve in the machine room for maintenance service.
2. For remote machine rooms, run the hydraulic pipe in a trench provided by others.
 - a. The pipe shall be welded and wrapped with a protective tape coat.
 - b. Enclose the pipe in a schedule 40 PVC sleeve which shall run from the machine room to the hoistway.
3. Adequately support the full run of pipe with isolation type support.
4. Where flexible hose and fitting assemblies, and flexible couplings are used for hydraulic connections, flexible hose and fitting assemblies shall:
 - a. Not be installed within the hoistway, nor project into or through any wall.
 - b. Installation shall be accomplished without introducing twist in the hose, and shall conform with the minimum bending radius of SAE 100 R2 type, high pressure, steel wire reinforced, rubber covered hydraulic hose specified in SAE J517.
 - c. Have a bursting strength sufficient to withstand not less than 10 times the working pressure.
 - d. Be permanently marked indicating:
 - 1) Manufacturer of the hose and fittings
 - 2) Type of hose and fitting
 - 3) Minimum factory test pressure
 - 4) Minimum bending radius of the hose
 - 5) Date of installation
 - 6) Inspection procedure
 - 7) Name of elevator contractor

F. Hydraulic Mainline Oil Strainer

1. Provide a mainline hydraulic oil strainer of the self-cleaning, compact type, equipped with a 40 mesh element and installed in the oil line.
2. Design the strainer for maximum system working pressure.

G. Hydraulic Oil Cooler

1. Provide a thermostatically controlled industrial standard oil-air heat exchanger, sized and designed to maintain a maximum oil temperature of 100 degrees F.
2. The oil cooler shall contain the following components mounted on a unit-frame:
 - a. A heat exchanger.
 - b. A three-phase motor driving a screw pump to circulate the oil through the heat

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exchanger.

- 1) The screw pump motor shall operate from a power source matching the main power unit pump motor thereby eliminating the need of a separate power feeder.
- c. A low-noise cooling fan designed to obtain the maximum cooling capacity of the unit.
3. Provide a separate disconnect for the oil cooler pump and fan to facilitate servicing.
4. The maximum noise level of the oil cooler assembly shall not exceed 50 dBa.

H. Hydraulic Check Valve

1. A check valve shall be provided and installed so that it will hold the elevator with rated load at any point when the pump stops and the down valves are closed or the maintained pressure drops below the minimum operating pressure.

I. Overspeed (Rupture) Valve

1. Where required by Code, an overspeed valve shall be provided and installed so that it will cause the flow of oil from the hydraulic jack through the pressure piping to cease when such flow exceeds a preset value relative to car speed in accordance with applicable codes.

J. Scavenger Pump

1. Provide a positive displacement, rotary type pump for the hydraulic elevator.
 - a. The pump shall have a 1/3 HP motor capable of pumping 100 ft. vertically.
 - b. The pump shall be self-priming and self-lubricating.
 - c. The pump shall be equipped with a 100 mesh screen strainer.
 - d. The pump housing shall be constructed of brass with stainless steel internal parts, and shall have a 3.5-gallon reservoir.
2. Mount oil return pump off the pit floor and connect it to the jack unit and the oil tank with copper tubing.
 - a. Install a minimum of two sound isolating couplings in the oil line in the machine room between pump and jack.
 - 1) Each coupling shall consist of two (2) machined flanges separated by two (2) neoprene seals to absorb vibration and to positively prevent metal-to-metal contact in the oil line.
 - 2) Build coupling in such a manner that they will be absolutely blow-out proof.
 - b. Install an oil-hydraulic muffler in oil line near power unit.
 - 1) The mufflers contain pulsation absorbing material inserted in a blow-out

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- proof housing.
 - 2) Rubber hose without blow-out proof features will not be acceptable.
- c. Provide sound reducing vibration isolation elements at all support points of elevator controllers and pump units.
 - 1) The elements shall be similar to double deflection neoprene-in-shear mounts, as manufactured by Mason Industries.
 - 2) All bolts through isolation elements, where necessary, are to incorporate resilient washers and bushings.
- d. Locate the power unit at least 1" from any walls.
- e. Use flexible conduit with ground wire for pump unit connections.

2.5 HOISTWAY EQUIPMENT

A. Guide Rails / Inserts / Brackets

1. Provide machined, standard size steel "T" section guide rails with tongue and grooved joints for the car. Use not less than 15.0-pound car rails.
2. Use not less than 3/4" thick machined steel fishplates to form rail joints. Connect rails to fishplate with four (4) bolts.
3. Provide rail backing where the vertical distance between support framing is greater than 14'-0" and no intermediate support framing is shown on the drawing.
4. All guide rails shall be erected plumb and parallel to a maximum deviation of 1/8 inch (plus or minus 1/16 inch).
5. Provide oversized steel members and brackets for the rails where the distances exceed the manufacturer's standard dimensions.
6. Provide rail backing and connect rails to top and bottom of structural members as shown on structural drawings where the vertical distance between support framing is greater than 14' – 0", and no intermediate support framing is shown on the contact documents.

B. Slide Guides

1. Provide stationary sliding type guide shoes with approved replaceable liners with positive feed lubricators.
2. Properly size the shoes according to speed, capacity and dimensions of the elevator.

C. Electrical Conduit / Wiring / Traveling Cable

1. Electrical wiring shall be provided.
 - a. All wiring shall be stranded copper conductors, manufactured in compliance with ANSI/ASTM B174-71 and UL 62 requirements, and polyvinyl chloride insulation complying with ETT requirements of UL 62 and Article 400 of the National Electric Code.
 - b. Electrical wiring provided for hoistway interlock shall be of a flame retardant type, capable of withstanding temperatures of at least 392 degrees Fahrenheit. Conductors shall be Type SF or equivalent.

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- c. Each run of electrical conduit or duct shall contain no less than 10% spare wires and, in any case, no fewer than two (2) spare wires.
 - d. Crimp-on type wire terminals shall be used where possible.
- 2. Traveling cable shall be provided.
 - a. Each traveling cable shall be provided with a flame and water resistant polyvinyl chloride jacket.
 - b. Electrical wiring shall consist of stranded copper conductors, manufactured in compliance with ANSI/ASTM B174-71 and UL 62 requirements, and polyvinyl chloride insulation complying with ETT requirements of UL 62 and Article 400 of the National Electric Code.
 - c. Each traveling cable shall contain no less than 10% spare wires.
 - d. Traveling cable must be contained within an approved electrical conduit to within 6' of the final suspension point in the hoistway.
 - e. Each traveling cable shall be arranged to provide no fewer than six (6) individually shielded pairs of 20-gauge wire and arranged to contain no less than one (1) coaxial cable for CCTV remote monitoring.
 - f. Traveling cable conductors that terminate at a hoistway center box shall be connected to stud blocks provided for that purpose.
 - 1) Each wiring terminal shall be clearly identified by its nomenclature as shown on the "as built" wiring diagrams and solderless, crimp-on type wire terminals shall be used where possible.
 - g. The attachment of a traveling cable to the underside of the elevator car shall be performed so that a minimum loop diameter of 30x the cable diameter is provided.
 - h. Pre-hang the cables for at least 24 hours with ends suitably weighted to eliminate twisting during operation.
- 3. Rigidly supported EMT conduit, flexible metal conduit and galvanized steel trough shall be utilized throughout the hoistway.
 - a. Both EMT and flexible conduit shall be connected on either end by use of compression fittings and secured in place with metal clamps sized in accordance with the diameter of conduit utilized.
 - 1) Wire or plastic wire ty-raps shall not constitute an acceptable means of fastening.
 - b. The use of flexible metal conduit shall be limited to runs not greater than 3' in length.

2.6 PIT EQUIPMENT

A. Car Buffer

- 1. Provide spring buffer with necessary blocking and horizontal steel braces under the car.

Elevator

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2. The buffer shall be tested and approved by a qualified testing laboratory.
3. Provide a permanent buffer marking plate which indicates the manufacturer's name, identification number, rated impact speed and stroke.
4. Support buffers from the pit floor level with all required blocking and bracing steel members.

B. Pit Stop Switch

1. Where pit depth does not exceed 67", each elevator pit shall be provided with a push/pull or toggle switch that is conspicuously designated "EMERGENCY STOP" and located so as to be readily accessible from the hoistway entrance on the lowest landing served at a height of approximately 18" above the floor.
 - a. This switch shall be arranged to prevent the application of power to the hoist motor when placed in the "OFF" position.
2. Where climb-in pit depth exceeds 67", each pit shall be provided with two (2) push/pull or toggle switches conspicuously designated "EMERGENCY STOP".
 - a. Both of these stop switches, shall be located immediately adjacent to the pit access ladder.
 - 1) Place one stop switch approximately 47" above the pit floor.
 - 2) Place the second stop switch 18" above the hoistway entrance sill on the lowest landing served.
 - 3) These switches shall be arranged so as to prevent the application of power to the hoist motor brake when either one is placed in the "OFF" position.

2.7 HOISTWAY ENTRANCES

A. Hoistway Entrance Structure

1. Frames - The frames shall be constructed of 14-gauge sheet steel.
 - a. Passenger Elevators - Provide stainless steel with No. 4 finish. Standard bolted type construction having matching end caps. Provide 2" wide square profile.
 - b. Service Elevator – Provide stainless steel with No. 4 finish standard bolted type construction having matching end caps. Provide 2" wide square profile frames.
2. Doors – The doors shall be constructed of 16 stainless steel with No. 4 finish, not less than 1-1/4" thick, reinforced to accept hangers, interlocks or door closers.
3. Equip all hoistway landing doors with one-piece full height non-vision wings of material and finish to match hall side of door panels. The doors shall be as follows:
 - a. Passenger Elevators - Provide stainless steel with No. 4 finish.
 - a. Service Elevator – Provide stainless steel with No. 4 finish

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4. Entrances shall bear 1 ½ hour label of Underwriters Laboratories, Inc.
5. Provide each door panel with two removable laminated plastic composition guides, arranged to run in sill grooves with a minimum clearance, replaceable without removing the door from the hangers and incorporating a steel fire stop.
6. Provide the leading edge of door panels with continuous black rubber astragal bumper strips.
 - a. The strips shall be relatively inconspicuous when the doors are closed and shall be easily replaced.
7. Provide rubber bumpers at the top and bottom of the door to stop them at their limit of travel in opening direction.
8. Sills - Provide narrow-type, extruded sills with the nosing approximately one (1) inch deep and running the full length of door travel.
 - a. The sills shall be at least 3/8 inch thick.
 - b. The wearing surface shall be of a non-slip type.
 - c. Rigidly secure the sills to the building construction by means of steel sill support brackets or blocking with necessary metal shimming or adjustments.
 - 1) Passenger Elevators – At typical Floors - Extruded aluminum
 - 2) Service Elevators – At Floors - Extruded nickel silver
 - d. Provide and rigidly secure sill support members to the building structure after blocking and leveling them with necessary metal shimming.
 - 1) Use 4" x 4" x ¼" angle for single speed entrances and 5" x 5" x 3/8" angle for two speed entrances.
 - 2) If formed sheet steel sill support members are used, the structural properties of these members shall match or exceed the structural properties of 4" x 4" x ¼" angle for single speed entrances, and 5" x 5" x 3/8" angle for two speed entrances.
9. Track Support - 3/16-inch-thick steel track support plate shall extend between and be bolted to the vertical steel struts with no less than two (2) bolts at each end.
10. Track Covers – 16-gauge steel cover plates shall extend the full travel of the doors.
 - a. Covers shall be made in sections for service access to hangers, sheaves, tracks and interlocks.
 - b. The sections above the door opening shall be movable from within the elevator car.
 - c. Cover fastening devices shall be non-removable from the cover.
11. Fascias – 16-gauge steel fascia plates shall extend at least the full width of the door and be secured at hanger support and sill with oval head machine screws.
 - a. Provide fascia plates where the clearance between the edge of the loading side of the platform and the inside face of the hoistway enclosure exceeds the code allowed clearance.

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12. Toe Guards - Provide 16-gauge steel toe guards to extend 12 inches below any sill not protected by fascia.
 - a. The toe guards shall extend the full width of the door and shall return to the hoistway wall at a 15-degree angle and be firmly fastened.
13. Dust Covers - Provide 16-gauge steel dust covers to extend 6 inches above any header not protected by fascia.
 - a. The dust covers shall extend to a full width of travel of the doors, return to the hoistway wall at a 15-degree angle and be firmly fastened.

B. Tracks / Hangers / Closers / Related Equipment

1. Formed or extruded steel landing door hanger tracks shall be provided.
2. Each landing door panel shall be suspended from a pair of door hanger assemblies that are compatible with the hanger tracks.
 - a. Hanger assemblies shall be directly mounted to the door panel using 3/8" diameter or better hardware.
 - b. Solid steel blocks shall be used where job-site conditions dictate the use of spacers between hanger assemblies and the landing door panel.
 - c. Hanger assemblies shall be adjusted or shimmed so that door panels are suspended in a plumb manner with no more than 3/8" vertical clearance to the cab entrance threshold.
 - d. Upthrust rollers shall be adjusted for minimal operating clearance against the bottom edge of the hanger track.
 - e. Means shall be provided to prevent hangers from jumping the track.
 - f. Blocks shall be provided to prevent rollers from overrunning the end of the track.
3. Each set of center opening landing doors shall be provided with a cable driven relating mechanism which is compatible for use with the door hanger assemblies.
 - a. The relating mechanism shall be properly tensioned and adjusted so as to equalize the relationship between the door panels and the hoistway entrance.
4. Each set of multi-speed center opening or side slide landing doors shall be provided with a Spirator-type spring closers should prevailing sill depth or runby clearance conditions require their use.
 - a. Drill each hoistway door to accommodate manufacturers standard lock release key and install escutcheon.
 - 1) Escutcheon shall be brushed stainless steel to match door panels where required.
5. Where multi-speed side slide door panels exist, provide a secondary interlocking device that will prevent separation of the panels should the sill closer or relating cable(s) fail.

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C. Interlocks / Unlocking Devices

1. Each set of landing doors shall be provided with a complete electromechanical interlock assembly.
 - a. Each interlock assembly shall consist of:
 - 1) A switch housing with contacts
 - 2) Lock keeper
 - 3) Clutch engagement/release subassembly
 - 4) Associated linkages
 - b. Arrange the lock so that individual leading door panels (side slide or center opening) are locked when in the closed position.
2. Non-typical mounting arrangements for interlocks and/or related mechanisms must receive prior approval from the Consultant.
3. Each hoistway door interlock assembly shall be provided with an emergency release mechanism utilizing a drop-leaf type access key at all landings served.
 - a. Each hoistway door shall accommodate manufacturer's standard lock release key with escutcheon.
 - 1) The key hole shall be fitted with a metal ferrule that matches the door finish.
 - 2) Drilling key holes in the field will not be accepted.

2.8 CAR EQUIPMENT / FRAME

A. Car Frame and Platform

1. The car frame shall be made of steel members, with the required factor of safety.
2. The car platform shall consist of a steel frame with necessary steel stringers, all securely welded together.
3. The frame and platform shall be so braced and reinforced that no strain will be transmitted to the elevator car.
 - a. Provide platform with two (2) layers of 3/4" thick marine grade plywood.
 - b. Cover the underside of the car platform with sheet steel.
4. The support frame shall carry rubber pads on which the platform shall rest without any connection to the steel frame for sound and vibration isolation.
5. Provide extruded aluminum thresholds having non-slip surface, guide grooves for PE1-PE2 and nickel silver thresholds for Service Concourse A.
6. Provide 1/4" thick aluminum diamond plate flooring for the service elevator Service Concourse A. Arrange flooring in sections and mount plates with countersunk stainless steel bolts to permit replacement from within the car without dismantling the car enclosure.

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7. Sound isolate all passenger elevator platforms with vibration isolation pads. The support frame shall carry rubber pads on which the platform shall rest without any connection to the steel frame.
8. Recess the passenger elevator platforms to receive finished flooring as selected by the Architect and specified under another section of their specification.

B. Automatic Leveling / Releveling / Positioning Device

1. Equip the elevator with a floor leveling device which shall automatically bring the car to a stop within 1/4" of any floor for which a stop has been initiated regardless of load or direction of travel.
2. This device shall also provide for releveling which shall be arranged to automatically return the elevator to the floor in the event the elevator should move below or above floor level in excess of 1/4".
3. This device shall be operative at all floors served and whether the hoistway or car door is open or closed provided there is no interruption of power to the elevator.
4. A positioning device shall be part of the controller microprocessor systems.
 - a. Position determination in the hoistway may be through fixed tape in the hoistway or by sensors fitted on each driving machine to encode and store car movement.
 - b. Design the mechanical features and electrical circuits to permit accurate control and rapid acceleration and retardation without discomfort.

C. Top-of-Car Inspection Operating Station

1. An inspection operating station shall be provided on top of the elevator car.
2. This station shall be installed so that the controls are plainly visible and readily accessible from the hoistway entrance without stepping on the car.
3. When the station is operational, all operating devices in the car shall be inoperative.
4. Provide the following control devices and features:
 - a. A push/pull or toggle switch designated "EMERGENCY STOP" shall be arranged so as to prevent the application of power to the hoist motor when in the "off" position.
 - b. A toggle switch designated "INSPECTION" and "NORMAL" to activate the top of car Inspection Service Operation.
 - c. Push button designated "Up", "Down" and "Enable" to operate the elevator on Inspection Service (the "Enable" button shall be arranged to operate in conjunction with either the "Up" or "Down" button).
 - d. An indicator light and warning buzzer that are subject to activation under Phase I - Fire Emergency Recall Operation.

D. Emergency Exits / Top

1. Ensure they operate as per code and have proper electrical contacts and mechanical locks on the exterior of the cab enclosure.

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E. Car Enclosure Work Light / Receptacle

1. The top and bottom of each car shall be provided with a permanent lighting fixture and 110 volt GFI receptacle.
2. Light control switches shall be located for easy accessibility from the hoistway entrance.
3. Where sufficient overhead clearance exists, the car top lighting fixture shall be extended no less than 24" above the crosshead member of the car frame.
4. Light bulbs shall be guarded so as to prevent breakage or accidental contact.

F. Master Door Power Operator System – VVVF/AC

1. Provide a heavy-duty master door operator on top of the elevator car enclosure for power opening and closing of the cab and hoistway entrance door panels.
2. Operator shall utilize an alternating current motor, controlled by a variable voltage, variable frequency (VVVF) drive and a closed-loop control with programmable operating parameters.
 - a. System may incorporate an encoder feedback to monitor positions with a separate speed sensing device or an encoder-less closed-loop VVVF-AC control to monitor motor parameters and vary power applied to compensate for load changes.
3. The type of system shall be designated as a high speed operator, designed for door panel opening at an average speed of 2.0 feet per second and closing at approximately 1.0 foot per second.
 - a. Reduce the closing speed as required to limit kinetic energy of closing doors to within values permitted by ASME A17.1 as may be adopted and/or modified by the AHJ.
4. The door shall operate smoothly without a slam or abrupt motion in both the opening and closing cycle directions.
 - a. Provide controls to automatically compensate for load changes such as:
 - 1) Use of different weight door panels on multiple landings
 - 2) Other unique prevailing conditions that could cause variations in operational speeds.
 - b. Provide nudging to limit speed and torque in conjunction with door close signaling/closing and timing devices as permitted by ASME A17.1 as may be adopted and/or modified by the AHJ. Nudging shall be initiated by the signal control system and not from the door protective device.
5. In case of interruption or failure of electric power from any cause, the door operating mechanism shall be so designed that it shall permit emergency manual operation of both the car and corridor doors only when the elevator is located in the floor landing unlocking zone.

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- a. The hoistway door shall continue to be self-locking and self-closing during emergency operation.
 - b. The door operator and/or car door panel shall be equipped with safety switches and electrical controls to prevent operation of the elevator with the door in the open position as per ASME A17.1 Code Standards.
 - c. Provide zone-lock devices as required by ASME A17.1 as may be adopted and/or otherwise modified by the AHJ.
6. Construct all door operating levers of heavy steel or reinforced extruded aluminum members, designed for stress and forces imposed on the related parts, linkages and fixed components during normal and emergency operation functions.
 - a. All pivot points shall have either ball or roller-type bearings, oilite bronze bushings or other non-metallic bushings of ample size.
 7. Provide operating data / data tag permanently attached to the operator as required by applicable code and standards.

G. Door Reopening Device

1. Provide an infrared curtain door protection system.
2. The door shall be prevented from closing and reopen when closing if a person interrupts any one of the light rays.
3. The door shall start to close when the protection system is free of any obstruction.
4. The infrared curtain protective system shall provide:
 - a. Protective field not less than 71" above the sill.
 - b. Where a horizontal infrared light beam system is used:
 - 1) A minimum of 47 light beams.
 - 2) Accurately positioned infrared lights to conform to the requirements of the applicable handicapped code.
 - c. Modular design to permit on board test operation and replacement of all circuit boards without removing the complete unit.
 - d. Controls to shut down the elevator when the unit fails to operate properly.

2.9 FINISH AND MATERIALS

A. Material, Finishes and Painting

1. General
 - a. Cold-rolled Sheet Steel Sections: ASTM A366, commercial steel, Type B
 - b. Rolled Steel Floor Plate: ASTM A786
 - c. Steel Supports and Reinforcement: ASTM A36
 - d. Aluminum-alloy Rolled Tread Plate: ASTM B632

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- e. Aluminum Plate: ASTM B209
- f. Stainless Steel: ASTM A167 Type 302, 304 or 316
- g. Stainless Steel Bars and Shapes: ASTM A276
- h. Stainless Steel Tubes: ASTM A269
- i. Aluminum Extrusions: ASTM B221
- j. Nickel Silver Extrusions: ASTM B155
- k. Bronze Sheet: ASTM B36(36M) alloy UNS No. C2800 (Muntz Metal)
- l. Structural Tubing: ASTM A500
- m. Bolts, Nuts and Washers: ASTM A325 and A490
- n. Laminated / Safety Tempered Glass: ANSI Z97.1

2. Finishes

a. Stainless Steel

- 1) Satin Finish: No. 4 satin, long grain
- 2) Mirror Finish: No. 8 non-directional mirror polished

b. Sheet Steel:

- 1) Shop Prime: Factory-applied baked on coat of mineral filler and primer
- 2) Finish Paint: Two (2) coats of low sheen baked enamel, color as selected by the Architect.
- 3) Steel Equipment: Two (2) coats of manufacturer's standard rust-inhibiting paint to exposed ferrous metal surfaces in both the hoistway and pit that do not have galvanized, anodized, baked enamel, or special architectural finishes.

3. Painting

- a. Identify all equipment including buffers, crosshead, controller, drive, disconnect switch, etc., by 4" high numerals which shall contrast with the background to which it is applied. The identification shall be either decalcomania or stencil type.
- b. Paint or provide decal-type floor designation not less than six (6) inches high on hoistway doors (hoistway side), fascias and/or walls as required by A17.1 Rule 100.7 at intervals not exceeding 7'-0". The color of paint used shall contrast with the color of the surface to which it is applied.

C. Designation and Data Plates, Labeling and Signage.

- 1. Provide an elevator identification plate on or adjacent to each entrance frame where required by the AHJ.
- 2. Elevators shall be identified by "number" only. Where a "letter" is used to identify the elevator, the letter shall indicate the Bank the elevator is in.
 - a. The designation numeral shall be a minimum of 3" in height.

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3. Provide floor designation plates at each elevator entrance, on both sides of the jamb at a height of 60 inches to center line of plate.
 - a. Floor number designations and Braille shall be 2" high, 0.03" raised and stud mounted.
4. Provide elevators with data and marking plates, labels, signages and refuge space markings complying with A17.1 Elevator Safety Code as may be adopted and/or otherwise modified by the AHJ.
5. Architect shall select the designation and data plates from manufacturer's premium line of plates.

2.10 FIXTURES / SIGNAL EQUIPMENT

A. General - Design and Finish

1. The design and location of the hall and car operating and signaling fixtures shall comply with the ADAAG.
2. The operating fixtures shall be selected from the manufacturer's premium line of fixtures.
3. Custom designed operating and signaling fixtures shall be as shown on the drawings or as approved by the Owner / Architect.
4. The layout of the fixtures including all associated signage and engraving shall be as approved by the Owner / Architect.
5. Where no special design is shown on the drawings, the buttons shall be as follows:
 - a. Stainless steel convex type as selected by the Architect from the manufacturer's premium line of push buttons.
 - b. The button shall have a collar with LED call registered light.
6. Where no special design is shown on the drawings, the faceplates shall be as follows:
 - a. Passenger and service Elevators
 - 1) Ground and Typical Floors: 1/8" thick Stainless steel faceplate with No. 4 finish and tamperproof screws. The screw and key switch cylinder finishes shall match faceplate finish.
7. Where key-operated switch and or key operated cylinder locks are furnished in conjunction with any component of the installation, four keys for each individual switch or lock shall be furnished, stamped or permanently tagged to indicate function.
8. All caution signs, pictographs, code mandated instructions and directives shall be engraved and filled with epoxy.

B. Main Car Operating Panel (all cars)

1. Provide a main car operating push button panel on the inside front return panel of the car.
2. Car operating panel shall be incorporated in the swing-front return of the elevator cab.

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- a. Coordination with car front manufacturer shall be the responsibility of the Elevator Contractor.
- b. Mount all key switches that are required to operate and maintain the elevators exposed on the car station except those specified within a locked service cabinet.
- c. The push buttons shall become individually illuminated as they are pressed and shall extinguish as the calls are answered.
- d. The operating panel shall include:
 - 1) A call button for each floor served, located not more than 48" above the cab floor.
 - 2) "Door open" / "Door close" / "Door Hold" buttons Service Concourse A.
 - 3) "Alarm" button, interfaced with emergency alarm. The alarm button shall illuminate when pressed.
 - 4) "Emergency Stop" switch per local law located at 35" above the cab floor.
 - 5) Self-dialing, hands-free telephone with call acknowledging feature and A.D.A. design provisions.
3. Locked Firemen's' Service cabinet, keyed in accordance with local Code, containing required devices and signals in accordance with ASME A17.1 Standards.
 - a. Automatic opening of the locked cabinet door may be provided with signals initiated by the fire detection and alarm system where approved by the Authority Having Jurisdiction.
4. Provide a locked service cabinet flush mounted and containing the key switches required to operate and maintain the elevator, including, but not limited to:
 - a. Independent/Attendant service switch with associated operating buttons and signal indicators.
 - b. Light switch.
 - c. Fan switch.
 - d. G. F. I. duplex receptacle.
 - e. Emergency light test button and indicator.
 - f. Inspection Service Operation key switch.
 - g. Port for hand-held service tool where applicable.
 - h. Dimmer for cab interior lighting.
5. Car operating panel shall incorporate:
 - a. An integral (no separate faceplate) digital L.E.D. floor position indicator
 - b. Emergency light fixture (without a separate faceplate) and black-filled engraved unit I.D. number or other nomenclature, as approved by Owner
 - c. A "No Smoking" advisory and the rated passenger load capacity.
6. Where posting of an advisory is permitted by the Governing Authority in lieu of the inspection certificate, engrave the following advisory on the hinged cover of the service cabinet, or where otherwise directed by the Owner.

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- a. Elevator Certificate is On File in Building Management Office.

C. In Car Video Display (If provided)

1. Provisions shall be made for the installation of a video display panel of a type and size as selected by the Owner.
 - a. Display shall be surface mounted.
 - b. Contractor shall coordinate the installation of the panel with the manufacturer and Owner as part of the base scope of work.

D. Car Position Indicator

1. The position of the car in the hoistway shall be indicated by the illumination of the position indicator numeral corresponding to the floor at which the car has stopped or is passing.
 - a. Provide standard car information display system in each operating panel. The system shall include 2" high position indicators with direction arrows and a message down loaded from Elevator Information and Management System. Messages will be selected and/or composed by the Owner and may include time, floor directories, outside temperature, promotional announcements. Display system shall have a screen of 12" by 12" with a minimum of 120-degree view angle.
 - b. Provide Lexan cover lens with hidden support frame behind fixture plate to protect the indicator readout.
 - c. Provide audible floor passing signal per ADA standards where not provided by the elevator signal control.
 - d. Flush mount fixture with cover to match selected car front or car operating panel finish as directed by the Owner.

E. Voice Annunciator

1. Provide a voice annunciator in each elevator.
2. Coordinate size, shape and design with Designer and other trades.
3. The system shall include, but not limited to:
 - a. Solid state digital speech annunciator
 - b. A recording feature for customized messages
 - c. Playback option
 - d. Built-in voice amplifier
 - e. Master volume control
4. Locate all associated equipment in a single, clearly labeled enclosure located either in the machine room and/or on car top.

F. Corridor Push Button Stations: 1 Riser each

1. A riser of push button signal fixtures shall be provided on all floors.
2. Each signal fixture shall consist of the following:

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- a. A flush-mounted faceplate.
 - b. Illuminating tamper-resistant push buttons measuring 3/4" at their smallest dimension as selected by the Owner.
 - c. A recessed mounting box, electrical conduit and wiring.
3. Intermediate landings shall be provided with fixtures containing two (2) push buttons while terminal landings shall be provided with fixtures containing a single push button.
4. Include firefighter key switch in the main lobby level station or other designated recall landing.
5. Push button signal fixtures shall be installed at a centerline height of 42" above the floor and shall be installed both plumb and flush to the finished wall.
 - a. Standardize the final distance on all floors.
6. Fixture faceplates shall be installed adjacent to the entrance frame on front wall.

G. Car Direction Lantern

1. Provide a car riding lantern with visual and audible signal in the edge of the strike and/or return post.
2. The lens shall project a minimum of 1/4" and shall be of solid Plexiglas.
3. Use tamperproof screws with surface mount faceplate and hairline joint.
4. Car lantern shall indicate the direction of travel when doors are 3/4 open.
5. The unit shall sound once for the "up" direction and twice for the "down" direction.
 - a. Provide an electronic chime with adjustable sound volume.

H. Hoistway Access Switch

1. Install a cylindrical type keyed switch at top terminal in order to permit the car to be moved at slow speed with the doors open to allow authorized persons to obtain access to the top of the car.
2. Where there is no separate pit access door, a similar switch shall be installed at the lowest landing in order to permit the car to be moved away from the landing with the doors open in order to gain access to the pit.
3. Locate the switch in the hall call push button station at the top and bottom terminal landings where required if allowed by the Authority Having Jurisdiction.
4. This switch is to be of the continuous pressure spring-return type and shall be operated by a cylinder type lock having not less than a five (5) pin or five (5) disc combination with the key removable only in the "OFF" position.
 - a. The lock shall not be operable by any key which operates locks or devices used for other purposes in the building and shall be available to and used only by inspectors, maintenance men and repairmen in accordance with A17.1 applicable Security Group.

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- I. Remote Monitoring System (EMIS) / Emergency Power Panel (If EP provided)
 1. Provide a desk type interactive computer-based Elevator Management Information System (EMIS) with multi-display terminals for all elevators. The system shall include:
 - a. The desk type interactive computer-based Elevator Management Information System (EMIS) shall have:
 - 1) A desktop PC with the most current high-performance processor, Windows 7 (64-bit version) or later operating system
 - 2) A 23" flat panel LED HD monitor
 - 3) A color laser printer with 16 ppm B/W and 12 ppm color printing speed
 - 4) A 104-key USB keyboard
 - 5) Locate the system as directed by the Architect
 - 6) Locate a 17" LED monitor and computer in each machine room for monitoring and trouble-shooting of the elevator equipment.
 2. Design the system with split screen to display the information in graphic or tabular form as follows:
 - a. Graphic Status Display: Display of an elevation representation of every car.
 - 1) Floor status
 - 2) Car status
 - 3) Hall calls
 - 4) Date and time, building and identification
 - b. The information indicated above (except for registered hall and car calls and floor security status) shall be displayed on screen simultaneously for each elevator connected to the EMIS for tabular format.
 - c. EMIS shall monitor various discrete signals from the elevator system and retain a log of up to the last 200 alarms/events.
 - d. The system shall display current status on screen and, from the keyboard, shall allow modification of the security status of each car, including car and hall call registration security lock-out.
 3. The EMIS shall be capable of sending information to and receiving instructions from the building security computer (BMS).
 4. The system shall provide the ability to use the keyboard to initiate and display interactive elevator operations, including but not limited to the following:
 - a. Display faults and events
 - b. Display alarm messages
 - c. Car and hall calls
 - d. Modifications of some elevator parameters such as door times, etc.
 - e. Any other special operations.
 - f. Security car and hall push button locks shall be controlled on a per unit, per landing, or per car basis with fire control over-rides per code.

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5. The system shall allow ability to view and print performance data for each car connected to the EMIS through the following screens:
 - a. Car operations screen showing the number of door operators, door reversals and car runs.
 - b. Car timing averages screen, showing averages for flight time, door opening and closing.
 - c. Hall calls screen shall show per elevator basis the number of hall calls in each direction broken down into the number answered in specified intervals.
 - d. Landing summary screen.
 - e. Any additional screens required.
6. The system shall provide the capability to view various reports generated from the data.
 - a. The following information for each elevator shall be shown in reports:
 - 1) Total number of hall calls (up/down)
 - 2) Average waiting times (up/down)
 - 3) Maximum wait and time at which it occurred
 - 4) Number of car calls per car
 - 5) Number of hall and car calls per landing (up/down)
 - 6) Average waiting time per landing
 - 7) Histogram of registration times
 - 8) For preset, adjustable time intervals for each car, a summary will be given of:
 - a) The number of door operations
 - b) Car runs
 - c) Averages of flight times and door times
 - 9) Record of every car and hall call registered
 - 10) Record of all events and alarms.
7. Emergency Power Control Panel: (If EP is provided) The panel shall have a 1/8" thick stainless steel faceplate, wall-mounted and contain:
 - a. 2" high LCD car position and travel direction indicators
 - b. Three (3) position (car to lobby/on/off) switches
 - c. Emergency selector switches and emergency power on indicator
 - d. "Car at the designated floor with its doors open" indicators
 - e. Telephone
 - f. The panel shall be located adjacent to the fire command center

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2.11 CAR ENCLOSURES

A. Service Elevator Concourse B (alternate G1).

1. Lower Wall Panels: 4'-0" high, 1/8" thick diamond tread aluminum wainscoting on all walls. Mount panels with countersunk stainless steel screws. The wainscoting shall be demountable from within the car.
2. Upper Wall Panels: 16-gauge stainless steel applied to shell.
3. Provide oval vent slots 4" above the floor.
4. Canopy: Paint canopy with a coat of primer and one coat of enamel paint.
5. Front Return Panels and Transom: Stainless steel with No. 4 finish.
6. Cab Doors: Stainless steel with No. 4 finish.
7. Lighting: Provide six (6) recessed down lights with compact LED lamps. The light fixture shall have aluminum alzak reflector.
8. Flooring: Provide 1/4" thick aluminum checkered plate floor covering in color and pattern selected by the Architect.
9. Handrails: Double row of 2" x 8" hardwood bumpers at 12" and 32" above floor on side and rear walls. Mount rails to cabs at 12" on centers and arrange them to be removable from within car. Suitably reinforce cab panel to provide for secure handrail mounting.

B. Service Elevator Main Terminal.

1. Wall Panels: plastic laminate in standard finishes applied to shell panels.
2. Provide oval vent slots 4" above the floor.
3. Canopy: Paint canopy with a coat of primer and one coat of enamel paint.
4. Front Return Panels and Transom: Stainless steel with No. 4 finish.
5. Cab Doors: Stainless steel with No. 4 finish.
6. Lighting: Provide six (6) recessed down lights with compact LED lamps. The light fixture shall have aluminum alzak reflector.
7. Flooring: Provide 1/2" thick Terazzo floor covering in color and pattern selected by the Architect.
8. Handrails: Manufacture's standard stainless steel on side and rear walls at recommended heights.

C. Replacement Passenger Elevator Main Terminal.

1. Wall Panels: plastic laminate in standard finishes applied to shell panels.
2. Provide oval vent slots 4" above the floor.
3. Canopy: Paint canopy with a coat of primer and one coat of enamel paint.
4. Front Return Panels and Transom: Stainless steel with No. 4 finish.
5. Cab Doors: Stainless steel with No. 4 finish.
6. Lighting: Provide six (6) recessed down lights with compact LED lamps. The light fixture shall have aluminum alzak reflector.
7. Flooring: Provide 1/2" thick Terazzo floor covering in color and pattern selected by the Architect.
8. Handrails: Manufacture's standard stainless steel on side and rear walls at recommended heights.

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D. Cab Fabrication and Installation

1. Maintain accurate relation of planes and angles with hairline fit of contacting panels and/or surfaces.
2. Any shadow gaps (reveals) between panels shall be consistent and uniform.
3. Unless otherwise specified or shown on the drawings, for work exposed to view use concealed fasteners.
4. Maximum exposed edge radius at corner bends shall be 1/16". There shall be no visible grain difference at the bends.
5. Form the work to the required shapes and sizes with smooth and even curves, lines and angles. Provide necessary brackets, spacers and blocking material for assembly of the cab.
6. Interior cab surfaces shall be flat and free of bow or oil canning. The maximum overall deviation between the low and high points of 24" x 24" panel section shall not exceed 1/32".
7. Make weights of connections and accessories adequate to safely sustain and withstand stresses to which they will be subjected.
8. All steel work except stainless steel and bronze materials shall be painted with an approved coat of primer and one (1) coat of baked enamel paint.

2.12 EMERGENCY LIGHTING / COMMUNICATIONS / SIGNALING

A. Battery Back Up Emergency Lighting Fixture and Alarm

1. Provide a self-powered emergency light unit.
 - a. Arrange two (2) of the cab light fixtures to operate as the emergency light system.
2. Provide a car-mounted battery unit including solid-state charger and testing means enclosed in common metal container.
 - a. The battery shall be rechargeable nickel cadmium with a 10-year minimum life expectancy. Mount the power pack on the top of the car.
 - b. Provide a 6" diameter alarm bell mounted directly to the battery/charger unit and connected to sound when any alarm push button or stop switch in the car enclosure is operated.
 - c. The bell shall be configured to operate from power supplied by the building emergency power generator. The bell shall produce a sound output of between 80-90 dBa (measured from a distance of 10') mounted on top of the elevator car.
 - 1) Activation of this bell shall be controlled by the stop switch and alarm button in the car operating station
 - 2) The alarm button shall illuminate when pressed.
3. Where required by Code for the specific application, the unit shall provide mechanical ventilation for at least one (1) hour.
4. The operation shall be completely automatic upon failure of normal power supply.
5. Unit shall be connected to normal power supply for car lights and arranged to be energized

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at all times so it automatically recharges battery after use.

B. Common Alarm Bell

1. Provide a common alarm bell located in the elevator pit.
 - a. The bell shall be configured to operate when the alarm or stop switch of any elevator is activated, during both normal and battery back-up power conditions.

C. Emergency Voice Communication / Telephone

1. A hands-free emergency voice communication system shall be furnished in each car mounted as an integral part of the car operating panel.
 - a. Necessary wires shall be included in the car traveling cable and shall consist of a minimum of one shielded pair of 20AWG conductors.
 - b. 120V power shall be provided to power the hands-free device.
2. The telephone shall be equipped with an auto-dialer and illuminating indicator which shall illuminate when a call has been placed and begin to flash when the call has been answered.
 - a. Engraving shall be provided next to the indicator which says "When lit help is on the way".
3. In addition to the standard "Alarm" button, a separate activation button shall be provided on the car operating panel to initiate the emergency telephone and place a call.
 - a. The telephone must not shut off if the activating button is pushed more than once.
 - b. The telephone shall transmit a pre-recorded location message only when requested by the operator and be provided with an adjustable call time which can be extended on demand by the operator.
 - c. Once two-way communication has been established, voice prompts shall be provided which instruct the operator on how to activate these functions as well as alerting the operator when a call is being attempted from another elevator in the building.
4. The system shall be compatible with ring down equipment and PBX switchboards.
5. The system shall be capable of serving as the audio output for an external voice annunciation system.
 - a. Conversation levels shall measure 60 dbA or higher and measure 10 dbA above ambient noise levels.
 - b. Each device shall be provided with a self-diagnostic capability in order to automatically alert building personnel should an operational problem be detected.
6. The phone shall be able to:
 - a. Receive incoming calls from any On-Site Rescue Station (when provided or required).

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- b. Receive incoming calls from other off-site locations via the public telephone system.
 - c. Acknowledge incoming calls and automatically establishing hands-free two way communications.
 - 1) If no On-Site Rescue Station is provided, each hands-free device shall have built in line consolidation which will allow up to 6 elevators to be called individually from outside the building over a single telephone line and up to 80 elevators if an On-Site Rescue Station is provided.
7. The emergency elevator communication system shall require a maximum of one telephone line.
- a. The system must provide line sharing capability to eliminate the need for a dedicated telephone line.
 - b. The line sharing function must ensure that the emergency telephones always receive dialing priority even if the line is in use and that the emergency telephones can be called into from an off-site location.
8. The system shall provide its own four (4) hour backup power supply in case of a loss of regular AC power.
9. The system must provide capability for building personnel to call into elevators and determine the charge state of any backup batteries provided for the emergency telephones.
10. Pushing the activation button in any of the elevator car stations will cause any on-site Rescue Station (where provided or required) or security telephone to ring.
- a. If the on-site call is not picked up within 30 seconds, the call will be automatically forwarded to a 24-hour off-site monitoring service.
 - b. The arrangements and costs of the off-site monitoring and telephone line shall be by others.
11. New telephone lines shall be provided and interfaced by others.

D. Life Safety System

- 1. Install Life Safety System speaker in each elevator cab.
- 2. Provide all necessary wiring and interfacing between the elevator system and the Life Safety System as required.
- 3. The Life Safety System speaker shall be furnished under Division 16.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Inspection

- 1. Study the Contract Documents with regard to the work as specified and required so as to ensure its completeness.

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2. Examine surface and conditions to which this work is to be attached or applied and notify the Owner in writing if conditions or surfaces are detrimental to the proper and expeditious installation of the work. Starting the work shall imply acceptance of the surfaces and conditions to perform the work as specified.
3. Verify, by measurements at the job site, dimensions affecting the work. Bring field dimensions which are at variance with those on the accepted shop drawings to the attention of the Owner. Obtain the decision regarding corrective measures before the start of fabrication of items affected.
4. Cooperate in the coordination and scheduling of the work of this section with the work of other sections so as not to delay job progress.

3.2 INSTALLATION / PROJECT PHASING

A. Installation

1. Install the elevators, using skilled personnel in strict accordance with the final accepted shop drawings and other submittals.
2. Comply with the code, manufacturer's instructions and recommendations.
3. Coordinate work with the work of other building functions for proper time and sequence to avoid delays and to ensure right-of-way of system. Use lines and levels to ensure dimensional coordination of the work.
4. Accurately and rigidly secure supporting elements within the shaftways to the encountered construction within the tolerance established.
5. Provide and install motor, switch, control, safety and maintenance and operating devices in strict accordance with the submitted wiring diagrams and applicable codes and regulations having jurisdiction.
6. Ensure sill-to-sill running clearances do not exceed 1 ¼" at all landings served.
7. Erect guide rails plumb and parallel with a tolerance of 1/8" (plus or minus 1/16")
8. Install rails so joints do not interfere with brackets.
9. Set entrance plumb in hoistway and in alignment with guide rails prior to erection of the front walls.
10. Arrange door tracks and sheaves so that no metal-to-metal contact exists.
11. Reinforce hoistway fascias to allow not more than 1/2" of deflection.
12. Install elevator cab enclosure on platform plumb and align cab entrance with hoistway entrances.
13. Sound isolate cab enclosure from car structure. Allow no direct rigid connections between enclosure and car structure and between platform and car structure.
14. Isolate cab fan from canopy to minimize vibration and noise.
15. Remove oil, dirt and impurities and give a factory coat of rust inhibitive paint to all exposed surfaces of struts, hanger supports, covers, fascias, toe guards, dust covers and other ferrous metal.
16. Prehang traveling cables for at least 24 hours with ends suitably weighted to eliminate twisting after installation.

3.3 FIELD QUALITY CONTROL

A. Inspection and Testing

Elevator

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1. Upon completion of each work phase or individual elevator specified herein, the Contractor shall, at its own expense, arrange and assist with inspection and testing as may be required by the A.H.J. in order to secure a Certificate of Operation.

B. Substantial Completion

1. The work shall be deemed “Substantially Complete” for an individual unit when, in the opinion of the Consultant, the unit is complete, such that there are no material and substantial variations from the Contract Documents, and the unit is fit for its intended purpose.
2. Governing authority testing shall be completed and approved in conjunction with inspection for operation of the unit; a certificate of operation or other required documentation issued; and remaining items mandated for final acceptance completion are limited to minor punch list work not incorporating any life safety deficiencies.
3. The issuance of a substantial completion notification shall not relieve the Contractor from its obligations hereunder to complete the work.
4. Final completion cannot be achieved until all deliverables, including but not limited to training, spare parts, manuals, and other documentation requirements, have been completed.

3.4 PROTECTION / CLEANING

A. Protection and Cleaning

1. Adequately protect surfaces against accumulation of paint, mortar, mastic and disfiguration or discoloration and damage during shipment and installation.
2. Upon completion, remove protection from finished surfaces and thoroughly clean and polish surfaces with due regard to the type of material. Work shall be free from discoloration, scratches, dents and other surface defects.
3. The finished installation shall be free of defects.
4. Before final completion and acceptance, repair and/or replace defective work, to the satisfaction of the Owner, at no additional cost.
5. Remove tools, equipment and surplus materials from the site.

3.5 DEMONSTRATION

A. Performance and Operating Requirements

1. Passenger and service elevators shall be adjusted to meet the following performance requirements:
 - a. Speed: within 3% of rated speed under any loading condition.
 - b. Leveling: within 1/4” under any loading condition.
 - c. Typical Floor-to-Floor Time: 10-12 seconds. (Recorded from the doors start to close on one floor until they are 3/4 open at the next floor.)
 - d. Door Operating Times:

Door Type

Opening

Closing

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Single Speed Side Opening 2.2 – 2.6 sec. 4.5 – 5.3 sec.

- e. Door dwell time for hall calls: 4.0 sec with Advance lantern signals
- f. Door dwell time for hall calls: 5.0 sec without Advance lantern signals
- g. Door dwell time for car calls: 3.0 seconds
- h. Reduced non-interference dwell time: 1.0 seconds.

2. Maintain the following ride quality requirements for the passenger elevators:

- a. Noise levels inside the car shall not exceed the following:
 - 1) Car at rest with doors closed and fan off - 40 dba.
 - 2) Car at rest with doors closed, fan running - 55 dba.
 - 3) Car running at high speed, fan off - 50 dba.
 - 4) Door in operation - 60 dba.
- b. Vertical and horizontal accelerations shall not exceed 14 milli-g.
 - 1) The accelerometer used for this testing shall be capable of measuring and recording acceleration to nearest 0.01 m/s² (1 milli-g) in the range of 0-2 m/s² over a frequency range from 0-80 Hz with ISO 8041 filter weights applied. Accelerometer should provide contact with the floor similar to foot pressure, 60 kPa (8.7psi).
- c. Amplitude of acceleration and deceleration shall not exceed 4.0 ft/sec².
- d. A sustained jerk shall not be more than twice the acceleration.
- e. The rate of change in the acceleration/deceleration rate shall not be greater than 8.0 ft/sec³.

B. Acceptance Testing

- 1. Comply with the requirements of Division 01.
- 2. The Contractor shall provide at least five (5) days prior written notice to the Owner and Consultant regarding the exact date on which work specified in the Contract Documents will reach completion on any single unit of vertical transportation equipment.
- 3. In addition to conducting whatever testing procedures may be required by local inspecting authorities in order to gain approval of the completed work, and before seeking approval of said work by the Owner, the Contractor shall perform certain other tests in the presence of the Consultant.
- 4. The Contractor shall provide test instruments, test weights, and qualified field labor as required to safely operate the unit under load conditions that vary from empty to full rated load and, in so doing, to successfully demonstrate compliance with applicable performance standards set forth in the project specifications with regard to:
 - a. Operation of safety devices.
 - b. Sustained high-speed velocity of the elevator in either direction of travel.
 - c. Brake-to-brake running time and floor-to-floor time between adjacent floors.
 - d. Floor leveling accuracy.
 - e. Door opening/closing and dwell times.

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- f. Ride quality inside the elevator car.
 - g. Communication system.
 - h. Load settings at which anti-nuisance, load dispatch, and load non-stop features are activated.
- 5. Upon completion of work specified in the Contract Documents on the last car and in conjunction with the aforementioned testing procedures, the Contractor shall carry out additional testing of control features in the presence of the Consultant.
- 6. The Contractor shall provide test instruments and qualified field labor as required to successfully demonstrate:
 - a. Simulated and actual emergency power operation
 - b. Firefighter, attendant and independent service operations
 - c. Restricted access security features and card reader controls
 - d. Zoning operations and floor parking assignments
 - e. Up/down peak operation
- 7. After hour tests of systems such as emergency generators, fire service, and security systems shall be conducted at no extra cost to the Owner.

END OF SPECIFICATION

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Section 14700 Escalators

PART 1 - GENERAL

1.1 Description

- A. Work Included: The extent of the work is indicated on the drawings.
- B. Work in this Section includes labor, materials, tools, equipment, appliances and services required to manufacture, deliver and install the units complete as shown on the drawings, as specified herein, and/or as required by job conditions.
- C. The work and /or requirements specified in all sections is described in singular with the understanding that identical work shall be performed on both units or associated systems unless otherwise specified herein.
- D. The work shall include, but is not limited to the following:
 - 1. Install two (2) new manufacturer's commercial standard - 40" wide step, glass balustrade escalators with 15'-4" of rise. All hoisting to be performed by the Elevator Contractor.
 - 2. Related equipment shall be designed, constructed, installed and adjusted to produce the highest results with respect to smooth, quiet, convenient and efficient operation, durability, economy of maintenance, and the highest standard of safety.
 - 3. It is not the intent of these specifications to detail the construction and design of all parts of the equipment, but it is expected that the type, materials, design, quality of work and construction of each part shall be adequate for the service required, durable, properly coordinated with all other parts, and in accordance with the best commercial standards applicable and of the highest commercial efficiency possible.
 - 4. Electric and magnetic circuits and related parts shall be of proper size, design and material to avoid heating and arcing, and all other objectionable effects which may reduce the efficiency of operation, economy of maintenance and/or net-useful life of the apparatus.
 - 5. The Owner/Architect may permit variations from the requirement of these specifications to permit use of the Contractor's standard equipment, provided such standard equipment is in every way adequate for the intended use and meets the full intent of these specifications. All such variations proposed by the manufacturer shall be called to the attention of the Owner/Architect and shall only be made if approved in writing prior to the award of the contract.
 - 6. General requirements for design, materials and construction are intended primarily to apply to the heavy-duty and important parts of the equipment specifically mentioned and to other parts of similar duty and importance. Less important and light-duty parts may be of the standard design, materials and construction provided that, in the opinion of the Owner/Architect, such standards are in accordance with the best commercial practice and are fully adequate for the purpose of use. All such variations shall be made only on the Owner/Architect written approval.
 - 7. All equipment and component parts installed, supplied or provided under this contract shall be manufactured and installed by company servicing the vertical transportation industry.

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- a. Apparatus shall conform to the design and construction standards referenced herein, and shall be rated the best commercial grade suitable for this application.
 - b. Equipment and component systems shall not employ any experimental devices or proprietary designs that could hamper and/or otherwise prohibit subsequent maintenance repairs or adjustments by all qualified contractors.
 - c. Manufacturers of the apparatus shall provide technical support and parts replacements for their equipment and component systems for a minimum of fifteen (15) years, and issue such guarantee of support to the purchaser with written certification naming the final Owner of their product(s) to ensure the apparatus or systems remain maintainable regardless of who may be selected for future service.
8. All equipment provided shall be factory and field tested with a history of design reliability and net-useful life established.
 - a. Contractor must be able to demonstrate the apparatus to be installed has been used successfully in a substantially similar manner under comparable conditions.
 - b. If the apparatus proposed differs substantially in construction, material composition, design, size, capacity, duty or other such rating from the equipment previously used for the same purpose by the manufacturer, the Owner/Architect may reject the apparatus or require the vendor test and demonstrate the adequacy and suitability for this particular situation. Any necessary tests shall be performed at the sole expense of the Contractor with no prior guarantee of acceptance after the testing procedure.
9. The Contractor shall not use as part of the permanent equipment any experimental devices, proprietary design, components, construction of materials which have not been fully tried out in at least substantially similar or under comparable service, except as may be especially approved by the Owner/Architect. If any important equipment or devices to be used on this installation differ substantially in construction, materials, design, size, capacity or duty from corresponding items previously used for the same purpose by the manufacturer, they shall pass such tests as the Owner/Architect may require to fully show their adequacy and suitability. These tests shall be in addition to tests herein specified and shall be made at the expense of the Contractor.
10. Certain design limitations, tests, etc., are herein specified as a partial check of the adequacy of design, construction and materials used. These requirements do not cover all features necessary to ensure satisfactory and approved operation, etc., of the equipment.
11. It is understood, the entire system shall be designed, fabricated, modified in full compliance with applicable local laws and code standards. The absence of a particular item or requirement shall not relieve the Contractor of the full and sole responsibility for such equipment, features and/or procedures.
12. With the exception of only those items specifically identified as being performed by others, the Specifications are intended to include all engineering, material, labor, testing, and inspections needed to achieve work specified by the Contract Documents. Inasmuch as it is understood that any incidental work necessary to complete the project is also covered by the Specifications, bidders are cautioned to familiarize themselves with the existing job site conditions. Additional charges for material or labor shall not be permitted subsequent to execution of the Contract.

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13. Bidders must report discrepancies or ambiguities occurring in the Specifications to the Owner/Architect for resolution prior to the bidding deadline, otherwise the Specifications shall be deemed acceptable in their existing form.

E. General

1. Escalators shall be the cleat step reversible type, self-contained units, capable of operating under full load conditions, in either direction for passenger service, at a specified incline from the horizontal and be complete with driving machine, safety devices, balustrading, etc., as herein specified. Design the unit for quiet and smooth operation at the specified speed.
2. Site verify vertical rise of each unit prior to fabrication.
3. Coordinate the delivery, storage and installation requirements of the escalators with the Construction Manager.
4. Sectionalize the units as required and stage their installation so that the surrounding structure, floor and wall construction are not disturbed.
5. Design the escalators for commercial service, 18-hour a day operation at a speed within 5% of rated speed under any loading conditions, without over stressing components and deteriorating performance.
6. Certify that the step/skirt clearance and skirt sliding coefficient of friction shall comply with the escalator step/skirt performance index as prescribed in the Code.

F. Related Sections

1. Division 01: Protecting wellway during installation of the equipment.
2. Division 01: Cutting and patching.
3. Division 03: Concrete pits and slabs.
4. Division 03: Wellway, pits and supports for truss - Concrete.
5. Division 05: Wellway, pits and supports for truss - Steel.
6. Division 05: Structural steel truss support beams and intermediate support plates.
7. Division 07: Escalator pit waterproofing.
8. Division 08: Interior Glass and Glazing.
9. Division 09: Finished flooring.
10. Division 09: Covering for the exterior of the escalator from the edge of the deck including covering for the truss and soffit. Materials shall be fire resistant and shall not weigh more than eight (8) pounds per square foot (unless further specified).
11. Division 26: Power feeders to starter panels / terminals of escalators / moving walks through fused main line switches
12. Division 26: Lights and GFCI receptacles at both ends of the escalator / moving walk.
13. Division 26: Signal wiring from smoke detectors to a junction box in the escalator.
14. Division 26: Empty conduit runs for wiring required to monitor escalators from a central location.
15. Division 26: Shunt trip devices to automatically disconnect the main power supply to the escalators prior to the activation of sprinkler system.

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- 16. Division 27: Telephone communications wiring terminated in a junction box located next to the escalator controller.
- 17. Division 27: Ethernet port in top end of each escalator, fire command center and building engineer's office.

G. Abbreviations and Symbols

- 1. The following abbreviations, Associations, Institutions, and Societies may appear in the Project Manual or Contract Documents:

AHJ	Authority Having Jurisdiction
AIA	American Institute of Architects
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWS	American Welding Society
IBC	International Building Code
IEEE	Institute of Electrical and Electronics Engineers
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Agency
OSHA	Occupational Safety and Health Act

H. Codes and Ordinances / Regulatory Agencies

- 1. Work specified by the Contract Documents shall be performed in compliance with applicable Federal, State, and municipal codes and ordinances in effect at the time of Contract execution. Regulations of the Authority Having Jurisdiction shall be fulfilled by the Contractor and Subcontractors. The entire installation, when completed, shall conform with all applicable regulations set forth in the latest editions of:
 - a. Local and/or State laws applicable for logistical area of project work.
 - b. Building Code applicable to the AHJ.
 - c. Elevator Code applicable to the AHJ.
 - d. Safety Code for Elevators and Escalators, ASME A17.1 and all supplements as modified and adopted by the AHJ.
 - e. Safety Code for Elevators and Escalators, A17.1S supplement to A17.1 as modified and adopted by the AHJ for Machine Room Less installations (MRL).
 - f. Guide for Inspection of Elevators, Escalators, and Moving Walks, ASME A17.2.

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- g. Safety Code for Existing Elevators and Escalators, ASME A17.3 as modified and adopted by the AHJ.
 - h. Guide for emergency evacuation of passengers from elevators, ASME A17.4.
 - i. National Electrical Code (ANSI/NFPA 70).
 - j. American With Disabilities Act - Accessibility Guidelines for Building and Facilities and/or A117.1 Accessibility as may be applicable to the AHJ.
 - k. ASME A17.5/CSA-B44.1 - Elevator and escalator electrical equipment.
2. The Contractor shall advise the Owner's Representative of pending code changes that could be applicable to this project and provide quotations for compliance with related costs.

I. Reference Standards

1. AISC - Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.
2. ANSI/AWS D1.1 - Structural Welding Code, Steel.
3. ANSI/NFPA 80 - Fire Doors and Windows.
4. ANSI/UL 10B - Fire Tests of Door Assemblies.
5. ANSI/IEEE - 519-Latest Edition
6. ANSI/IEEE - Guide for Surge Withstand Capability (SWC) Tests
7. ANSI Z97.1 – Laminated/Safety Tempered Glass

J. Definitions

1. Defective Work: Operation or control system failure, including excessive malfunctions; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.
2. Provide: Where used in this document, provide shall mean to install new device, apparatus, system, equipment or feature as specified in this document.
3. Definitions in ASME A17.1 as amended or modified by the AHJ apply to work of this Section.

1.2 PERMITS AND SUBMITTALS

A. Permits

1. Comply with the requirements of Division 01.
2. Prior to commencing work specified by the Contract Documents, the Contractor shall, at its own expense, obtain all permits or variances as may be required by the AHJ and provide satisfactory evidence of having obtained said permits and variances to both the Owner's Representative and Consultant.
3. File necessary drawings for approval of all Authorities Having Jurisdiction.

B. Submittals

1. Comply with the requirements of Division 01.
2. Submit the following

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a. Samples

Item No.	Quantity	Size	Description
S1	3	12" x 12"	Exposed finishes as requested by Architect

b. The samples shall be:

- 1) Held on site after inspection and used as a standard for acceptance or rejection of subsequent production units.
- 2) Labeled to identify their intended use and relation to the documents, e.g., car finishes, control panel, etc.
- 3) Returned to the elevator contractor at the completion of the project.

Subject to approval, where an item of equipment is a standard item, copies of the manufacturer's catalogue or brochure may be accepted provided that all dimensions and relevant information are shown in the catalogue or brochure.

c. Shop Drawings - Submit computer generated layout drawings for approval. Include the following:

- 1) Fully dimensioned escalator plan and sections including:
 - a) Support location, loads and details
 - b) Balustrade details
 - c) Floor plate details
 - d) Control/safety details
 - e) Service connections
 - f) Location and details of fixtures and signs
 - g) Wiring diagrams

d. Calculations

- a) Support loads/reactions
 - b) Electrical loads including starting and running currents
 - c) Auxiliary loads
 - d) Submit design calculations identifying design forces and support capacities. A registered professional engineer registered shall certify the calculations.
- 2) A listing of all components, devices, fully dimensioned plan and section and sub-systems including:
 - a) Manufacturer and location of plant
 - b) Size and model number
 - c) Service connections

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- d) Reactions
- e) Wiring diagrams

C. Measurements and Drawings

1. Drawings or measurements included with the bidding material shall be for the convenience of the bidders only and full responsibility for detailed dimensions lies with the Contractor.
2. In the execution of the work on the job, the Contractor shall verify all dimensions with the actual conditions.
3. Where the work of the Elevator Contractor is to join other trades, the shop drawings shall show the actual dimensions and the method of joining the work of the various trades.

D. Keys

1. Upon the initial acceptance of work specified by the Contract Documents on each unit, the Contractor shall deliver to the Owner, six (6) keys for each general key-operated device that is provided under these specifications in accordance with ASME A17.1, Part 8 standards as may be adopted and modified by the AHJ.
2. All other keying of access or operation of equipment shall be provided in accordance with ASME A17.1 Part 8 as may be adopted and modified by the AHJ.

E. Diagnostic Tools

1. Prior to seeking final acceptance of the project, the Contractor shall deliver to the Owner any specialized tools required to perform diagnostic evaluations, adjustments, and/or programming changes on any microprocessor-based control equipment installed by the Contractor. All such tools shall become the property of the Owner.
 - a. Owner's diagnostic tools shall be configured to perform all levels of diagnostics, systems adjustment and software program changes which are available to the Contractor.
 - b. Owner's diagnostic tools that require periodic re-calibration and/or re-initiation shall be performed by the Contractor at no additional cost to the Owner for a period equal to the term of the maintenance agreement from the date of final acceptance of the project.
 - c. The Contractor shall provide a temporary replacement, at no additional cost to the Owner, during those intervals in which the Owner might find it necessary to surrender a diagnostic tool for re-calibration, re-initiation or repair.
2. Contractor shall deliver to the Owner, printed instructions, access codes, passwords or other proprietary information necessary to interface with the microprocessor-control equipment.

F. Software Programs

1. During the life of the equipment and subject to the term of the maintenance agreement, where revisions to firmware and/or software are issued by the control manufacturer or manufacturer of solid state and microprocessor based subsystems subsequent to the

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beneficial use of the equipment, updates shall be provided so that the installation and spare circuit boards are current with respect to software and firmware versions.

G. Wiring Diagrams, Operating Manuals and Maintenance Data

1. Comply with the requirements of Division 01.
2. Deliver to the Owner, four (4) identical volumes of printed information organized into neatly bound manuals prior to seeking final acceptance of the project.
3. The manuals shall also be submitted in electronic format on non-volatile media, incorporating raw 'CAD' and/or Acrobat 'PDF' file formats.
4. Manuals, as well as electronic copies, shall contain the following:
 - a. Step-by-step adjusting, programming and troubleshooting procedures that pertain to the solid-state microprocessor-control and motor drive equipment.
 - b. Passwords or identification codes required to gain access to each software program in order to perform diagnostics or program changes.
 - c. A composite listing of the individual settings chosen for variable software parameters stored in the software programs of both the motion and dispatch controllers.
 - d. Method of control and operation.
5. Provide four (4) sets of "AS INSTALLED" straight-line wiring diagrams in both hard and electronic format in accordance with the following requirements:
 - a. Displaying name and symbol of each relay, switch or other electrical component utilized including identification of each wiring terminal.
 - b. Electrical circuits depicted shall include all those which are hard wired in both the machine room and hoistway.
 - c. Supplemental wiring changes performed in the field shall be incorporated into the diagrams in order to accurately replicate the completed installation.
6. Furnish four (4) bound instructions and recommendations for maintenance, with special reference to lubrication and lubricants.
7. Manuals or photographs showing controller repair parts with part numbers listed.

H. Patents

1. Patent licenses which may be required to perform work specified by the Contract Documents shall be obtained by the Contractor at its own expense.
2. The Contractor agrees to defend and save harmless the Owner, Consultant and agents, servants, and employees thereof from any liability resulting from the manufacture or use of any patented invention, process or article of appliance in performing work specified in the Contract Documents.

I. Advertising

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Advertising privileges shall be retained by the Owner. It shall be the duty of the Contractor to keep the job site free of posters, signs, and/or decorations. Contractor's logo shall not appear on the escalator exterior equipment.

1.3 QUALITY ASSURANCE

A. Qualifications

1. The work shall be performed by a company specialized in the business of manufacturing, installing and servicing conveying systems of the type and character required by these specifications with a minimum of ten (10) years' experience.
2. Prior written acceptance is required for manufacturers other than those listed, before quoting this project. Requests for acceptance will not be considered unless they are submitted before bid date and are accompanied by the following information:
 - a. List of five (5) similar installations having exact equipment being proposed for this project arranged to show name of project, system description and date of completed installation. The list shall include the names, position and resumes of the construction team and field supervisor of the installations.
 - b. Complete literature, performance and technical data describing the proposed equipment. Include the names, position and resumes of the proposed construction team and field supervisor.
 - c. List of ten (10) service accounts by building name, building manager or owner, including phone numbers.
 - d. Location of closest service office from which conveying system will be maintained.
 - e. Location of closest parts inventory for this installation.
 - f. List of the names, positions and resumes of the construction teams and field supervisor for the installation.

B. Structural, Mechanical and Electrical Design Parameters

1. The mechanical and electrical systems and the building structure have been designed for the following design loads:
 - a. Structural Loads:
 - 1) The pit, machine room and rail loads are shown on the drawings.
2. Power supply: 480-3-60
3. Electrical Loads: Refer to VT Drawings
4. Heat Release: 12,000 BTU / Hr / Unit
5. Submit a written statement with the bid that the above design loads and the clearance requirements shown on the Architectural drawings are acceptable for the proposed equipment. If not, specifically state the design variances.
6. After the award, if the type of equipment provided requires structure, mechanical and electrical system changes and/or revisions, the Elevator Contractor shall be responsible for all additional design and construction costs.

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7. Electrical equipment, motors, controllers, etc., installed under this contract shall have necessary CSA/US or UL listing as may be required by the AHJ. Equipment shall be labeled or tagged accordingly.

C. Materials, Painting and Finishes

1. Two (2) coats of rust-inhibiting machinery enamel shall be applied to exposed ferrous metal surfaces in the pit that do not have a galvanized, anodized, baked enamel, or special architectural finishes.
2. Two (2) coats of rust-inhibiting enamel paint to the machinery located within the wellway as well as to the truss section.
3. Architectural metal surfaces of bronze or similar non-ferrous materials which are specified, shall be sufficiently clear coated so as to resist tarnishing during normal usage for a period of not less than twelve (12) months after final acceptance by the Owner.

D. General

1. Cold-rolled Sheet Steel Sections: ASTM A1008, commercial steel, Type “B”.
 - a. Shop Prime: Factory-applied baked-on coat of mineral filler and primer.
 - b. Finish Paint: Two (2) coats of low-sheen baked enamel, color as selected by the Architect.
 - c. Steel Equipment: Two (2) coats of manufacturer’s standard rust-inhibiting paint.
 - 1) Rolled Steel Floor Plate: ASTM A786
 - 2) Steel Supports and Reinforcement: ASTM A36
 - 3) Aluminum-alloy Rolled Tread Plate: ASTM B632
 - 4) Stainless Steel: ASTM A240 Type 302 (for interior) or 316 (for exterior)
 - a) Satin Finish: No. 4 satin, long grain.
2. Stainless Steel Bars and Shapes: ASTM A276
3. Stainless Steel Tubes: ASTM A269
4. Aluminum Extrusions: ASTM B221
5. Structural Tubing: ASTM A500
6. Bolts, Nuts and Washers: ASTM A325 and A490.
7. Clear Tempered Glass: ASTM C1048

1.4 DELIVERY / STORAGE / HANDLING / COORDINATION

A. Delivery and Storage of Material and Tools

1. Comply with the requirements of Division 01.
2. Delivery, Storage and Handling:
 - a. Deliver materials to the site ready for use in the accepted manufacturer's original and unopened containers and packaging, bearing labels as to type of material, brand

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name and manufacturer's name. Delivered materials shall be identical to accepted samples.

- b. Store materials under cover in a dry and clean location, off the ground.
 - c. Remove delivered materials which are damaged or otherwise not suitable for installation from the job site and replace with acceptable materials.
3. The Owner shall bear no responsibility for the materials, equipment or tools of the Contractor and shall not be liable for any loss thereof or damage thereto.
 4. The Contractor shall confine storage of materials on the job site to the limits and locations designated by the Owner and shall not unnecessarily encumber the premises or overload any portion with materials to a greater extent than the structural design load of the Facility.
 5. It is understood that the delivery and setting of any escalator unit is to be completed in one operation. No storage of the units will be permitted on the site.

B. Work With Other Trades / Coordination

1. Coordinate installation of sleeves, block outs, equipment with integral anchors, and other items that are embedded in concrete or masonry for the applicable equipment. Furnish templates, sleeves, equipment with integral anchors, and installation instructions and deliver to Project site in time for installation.
2. Coordinate sequence of installation with other work to avoid delaying the Work.
3. Coordinate locations and dimensions of other work relating to the equipment scheduled for installation including pits; and electrical service, electrical outlets, lights, and switches in pits and as it relates to the specific equipment.
4. Coordination with and for the Owner with the General Contractor for the building work.

1.5 RELATED WORK

A. Work By Others

1. The following requirements shall be applicable based on prevailing conditions at the site of work and/or mandated modifications for code compliance. The following items to be performed or furnished by the Owner or General Contractor or their agents in accordance with governing codes.
 - a. Installation of new main line power feed with related disconnect switch designed and located per local law requirements.
 - b. Installation of auxiliary power feed with related distribution panel(s) and disconnect(s) designed and located per local law requirements.
 - 1) Circuit breakers and/or fused disconnects shall be lockable in the "OFF" position in accordance with applicable code.
 - c. Provide each escalator pit with a 110 volt GFI duplex receptacle and a permanent lighting fixture equipped with protective guard. Illumination shall be no less than 10 foot-candles at pit floor level. A light control switch shall be provided. Sumps

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in pits where provided, shall be covered. The cover shall be level with the pit floor so as not to produce a tripping hazard.

2. Provide adequate access to the wellway to allow for setting in place. All hoisting is to be provided by Elevator Contractor. If the project is not ready for escalator placement at time of delivery, a 12' x 60' secure, dry storage area for each escalator located close to the escalator wellway must be provided.
3. Provide sufficient on-site refuse containers for the proper disposal of escalator packaging. If such on-site refuse containers are not provided, the Owner or General Contractor will be completely responsible for the disposal of packaging material.
4. Stairwell / elevator access to all floors.
5. Provide a clear, unobstructed workspace of approximately 12' X 60' adjacent to each wellway for each escalator.
6. OSHA compliant overhead and floor opening protection will be in place adjacent to and in the general area of each escalator.
7. Areas with general public occupation require barricades or guards at least 8' high (including protected entrances). These barricades are for the protection of the workmen and general public, and shall be constructed to prevent the entrance of unauthorized personnel to the construction area, yet be of such size as to permit work to proceed with reasonable efficiency.
8. Pit and floor openings shall be dry and clean and of proper dimensions in accordance with the requirements of Elevator Contractor's shop drawings.
9. Provide a class "ABC" fire extinguisher in the upper machine space located convenient to the access door/floor plate.
10. All cutting of walls, floors, ceilings or partitions together with any repairs made necessary by such cutting or changes and all painting incidental thereto.
11. Column lines and benchmarks for finish floor levels and escalator centerlines provided to ensure accurate escalator installation.
12. Electrical power, during the erection of the escalator to provide light and to operate tools and hoists.
13. Escalator supports, properly located and capable of meeting the load requirements per Elevator Contractor's shop drawings, for the truss at the landings and intermediate supports (if required.) If concrete beams are used as supports, bearing plates must also be supplied. Loads listed on Elevator Contractor shop drawings include live load and ten lbs. per square foot of cladding on the sides. Owner or General Contractor will advise Elevator Contractor if cladding other than drywall will be used.
14. Escalator supports are not to be fireproofed (by others) until escalator truss is in place.
15. All other builders' work necessary for the installation of the escalator, including but not limited to all necessary changes to conduits, piping ducts, sprinkler systems, fireproofing and any other utilities.
16. Covering of exterior of escalator from the edges of the deck covers, including covering or exterior cladding for truss and soffit (the bottom of the escalator truss). Cladding material may not exceed 10 pounds per square foot.
17. Method for attaching cladding must be coordinated with Elevator Contractor. Drilling holes without advance approval may compromise the structural integrity of the truss.
18. Suitable floor fill and patching of flooring including floor covering, adjacent to the landing plates of the escalator. All floor finishing is to be completed after installation of the landing plates.

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19. Under seismic conditions, forces developed by building movement must not be allowed to transfer to truss (A17.1-8.5). The gap between the finished floor and floorplate at the lower landing is to be filled with compressible material or covered to allow for movement in the longitudinal direction.
20. Machine space must be maintained at an ambient temperature range between a minimum of 39 degree F (4 degree C) and a maximum of 104 degree F (40 degree C). Relative humidity shall not exceed 80% non-condensing.
21. A permanent three phase electrical feeder system, with a separate equipment-grounding conductor, terminating at a terminal block in a junction box in the escalator machine space (the terminal block and junction box are provided by the escalator contractor). The size of the feeders and grounding conductor shall be sized to meet the electrical characteristics of the escalator as shown on the Elevator Contractor's Confirmation of Power Supply. A fused disconnect switch or circuit breaker capable of being locked in the open position, for each escalator per the National Electrical Code (ANSI/NFPA 70) with feeder or branch wiring to controller (NEC 620-51). The disconnect shall also be installed with flexible leads so that it can be repositioned to meet the clear working space requirements on NEC 110.26(A).
22. A 120 Volt power supply with grounding conductor, rated at not less than 15 A terminating at a duplex receptacle, accessibly located under the access plates at both the top and bottom landing. All receptacles shall have ground-fault circuit-interrupter protection.
23. Convenient light fixture with switch in machine space at upper landing and lower landing pit.
24. Wiring/conduit for connections to remote monitoring/safety systems. If remote monitoring is included in the installation, one dedicated outside telephone line to the escalator machine space must be furnished
25. The installation of all permanent enclosures, railings and smoke baffles for the escalator wellway as may be required by applicable codes or authorities.
26. The entry and exit zone that is kept clear of all obstacles. The width of the zone shall be not less than the width between the centerlines of the handrails plus 200 mm (8 in). The length of the zone, measured from the end of the newel, shall be not less than twice the distance between the centerlines of the handrails. Space shall be provided to accommodate all traffic in the safety zone.
27. Once the escalator installation has been completed or the Elevator Contractor has been required to leave the site while finishing work is being completed, the Owner or General Contractor shall protect the escalators from damage.
 - a. The escalators must be properly barricaded at the top and bottom ends and their entire length covered. No access to anyone shall be provided for any reason.
 - b. Note that proper protection of the escalator units is important to obtaining a quality finished product.
 - c. Damage to an escalator installation can be caused by:
 - 1) Water and / or other liquids
 - 2) Material falling onto the step treads, such as drywall screws and other debris
 - 3) Fine dust from drywall finishing or concrete grinding
 - 4) Paint
 - 5) Finishing of floors
 - 6) Concrete, drywall mud and sprayed finishes

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- 7) Using the escalator as a stairwell

1.6 WARRANTY / MAINTENANCE SERVICES

A. Contract Close-Out, Guarantee and Warranties

1. Comply with the requirements of Division 01.
2. Guarantee and Warranties:
 - a. Warrant the equipment installed under these specifications against defects in material and quality of installation and correct any defects not due to ordinary wear and tear or improper use of car which may develop within one year from the date each escalator is completed and placed in permanent operation and accepted by the Owner.
 - b. This warrantee shall be written and issued at the completion of each unit prior to final payment.

B. Maintenance

1. Interim Maintenance: Provide full protective maintenance on the units that are completed and accepted by the AHJ and that may be put in service prior to the overall project completion. The maintenance service shall be as hereinafter specified under the Full Protective Maintenance Service in "3" below and include all code mandated safety and local law tests and inspections that may come due while on this service.
 - a. The price quoted shall be on a per unit per month basis.
2. Warranty Maintenance: Provide full protective maintenance on the specified equipment for a period of twelve (12) months from the date of final acceptance of the entire installation as specified under the Full Protective Maintenance Service in "3" below.
 - a. The price for this service shall be included in the base price or as otherwise specified in the contract documents.
 - 1) Full Protective Maintenance Service: Submit a separate price for a Full Protective Maintenance Service for the specified units based on a five (5) year contract. Long-term full comprehensive maintenance and related services shall be provided in accordance with the Contractor's Form of Full Protective Maintenance Services submitted with the bidding documents and as further specified.
 - 2) Costs related to long-term maintenance shall be included in the base bid quotation as a break-out fee.
3. All maintenance shall comply with Part 8 of the ASME A17.1 Code and modified or amended by the Authority Having Jurisdiction.
 - a. Maintenance work shall be performed by trained personnel directly employed and supervised by the service contractor.

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- b. Perform scheduled maintenance work and repairs during the regular working hours of regular working days of the trade. All work shall be coordinated with the Building Manager.
- 4. Provide emergency callback service and repair twenty-four (24) hours a day, seven (7) days a week, including holidays, between regular examinations. Overtime calls to be billed only the overtime premium. The response time during working hours shall not exceed one (1) hour. Perform emergency repairs within four (4) hours to restore the equipment to operating order.
 - a. Shutdown of any escalator

C. Maintenance

- 1. Provide full protective maintenance on the specified equipment for a period of twelve (12) months from the date of final acceptance of the entire installation.
- 2. Include 24 hour emergency callback service between regular examinations at no extra cost to the Owner. The response time shall not exceed one (1) hour.
- 3. Maintenance work shall be performed by personnel under supervision and in direct employ of manufacturer and installer.
- 4. Provide interim maintenance on the units that are completed and put in service prior to the overall project completion.
- 5. Perform maintenance work during the regular working hours of regular working days of the trade.
- 6. Maintenance shall include systematic examination, adjustment and lubrication of all equipment and apparatus, including repair or replacement of electrical and mechanical parts of the equipment and apparatus. Repair equipment whenever required and use only genuine standard parts produced and manufactured for equipment concerned.
- 7. Supply all necessary lubricants, cleaning materials and repair parts required to keep installations in good working order during maintenance periods.
- 8. Adequate stock of spare parts for maintenance or repair work and minor callback service repairs shall be stocked within the confines of the building in areas designated and assigned by the Owner.
- 9. Additional parts of other equipment required for maintenance and repair of the systems may be stored at the Contractor's facilities with the understanding delivery of same for emergency procedures must be made within four (4) hours to the job site.
- 10. Other materials and equipment normally not stocked by the Contractor locally must be available within twenty-four (24) hours for delivery to the job site from remote facilities and/or Supplier Contractors responsible to the Contractor for stocking the materials or equipment.
- 11. If the requirements for stockade of parts as defined herein are not met on any item, the Contractor shall immediately notify the Owner in writing as to the circumstances and provide a confirmed delivery date for the required materials and equipment.
- 12. Spare parts and materials for preventive maintenance on site shall be cataloged and inventoried.
 - a. Provide expanded parts list for approval.

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1.7 ALTERNATES / ALLOWANCES / UNIT PRICES

1. Alternate - Value Engineering Alternate

- a. It is understood that the base specification reflects minimum standards.
- b. Voluntary alternate prices may be acceptable as a deviation from, not a substitution for, the basis of bid work of this bid package.
- c. In order to submit a voluntary alternate, the following must be provided at the time of the bid.
 - 1) A complete bid reflecting the requirements of the base specification.
 - 2) All alternates must be accompanied with pertinent data, technical documentation and reference/installation for review.
 - 3) Along with the pricing for voluntary alternates submit the maintenance prices for each.

PART 2 - PRODUCTS

2.1 WORK INCLUDED

- A. Two (2) New Escalators

2.2 CODES

- A. All work will be installed in accordance with the prevailing code for the jurisdiction. Where a situation arises where local code is inconclusive, the latest ASME-A 17.1 – Safety Code for Elevators and Escalators will apply.

2.3 GENERAL DESCRIPTION

- A. Escalator Nos.

1. Type -	Interior Commercial units
2. Quantity-	Two (2)
3. Incline -	30 degrees
4. Step width	40"
5. Vertical Rise -	15' – 4"
6. Floors Served -	One (1) and (2)
7. Number of Intermediate Supports -	None
8. Speed -	100 fpm (nominal)

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9.	Flat steps -	Two (2)
10.	Inside balustrade material -	Clear tempered safety glass
11.	Balustrade joints -	Vertical
12.	Deckboard and skirt -	Stainless steel No. 4 finish
13.	Handrail color -	Black
14.	Handrail lighting -	N/A
15.	Combplate Color -	Yellow
16.	Step Color -	Black
17.	Operating Requirements	7 days a week, 18 hours per day of which 8 hours are with heavy traffic
18.	Remote Monitoring and Management System -	Required
19.	Power Supply -	480V
20.	Seismic Design -	Not required

2.4 SYSTEMS AND COMPONENTS

A. Pre-Approved Equipment Manufacturers

1. Only Original Equipment Manufacturers have been pre-approved for use on this project. The pre-approved manufacturers are as follows: Otis, Schindler and ThyssenKrupp.

B. Controllers

1. The controller shall be of the microprocessor type, designed to connect the drive motor to the electric service, protect the motor against overload, and provide proper control of the escalator. Should any safety device operate, the controller shall automatically cut off power to the motor and apply the service brake to bring the unit to a quick, smooth, safe stop within the code prescribed distance.
 - a. Provide soft start operation with energy saving feature.
2. Mount all electrical equipment on insulated panels with adequate spacing and protect them to prevent personnel from contacting equipment during normal operation.
3. All panel wiring shall be neatly formed and tied.
 - a. The terminals are to have indelible means of identification to facilitate testing and

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- repair.
 - b. The identification markings shall be coordinated with identical markings used on the wiring diagrams.
 - 4. Locate the controller in the machine space.
 - a. The controller shall be removable with flexible connecting cables and a device to stand controller firmly upright when removed from machine space.
 - 5. Provide fault finder panel for each unit.
 - a. The panel shall indicate which safety device has caused the unit to stop.
 - b. The panel shall have a capacity of retaining the last 16 faults and permit testing of all of the safety devices.
- C. Driving Machine and Motor
 - 1. The driving machine shall be of the worm or helical gear type, especially designed for escalator service and provided with accurately machined gears driven by a moderate speed A.C. motor. The driving machine shall be of sufficient size and capacity to operate without exceeding horsepower of the driving motor.
 - 2. The motor rating shall be based on a temperature rise not exceeding 50 degrees C after a continuous run of one hour at room temperature. The motor speed shall not exceed 1200 rpm and shall conform to the standards of the IEEE 519.
- D. Service Brake
 - 1. Mount an electrically released and spring applied service brake of sufficient capacity to stop and hold a fully loaded escalator on the main drive shaft or on the moving walk machine.
 - 2. This brake shall apply every time the power is removed from the motor by operation of any of the safety devices.
- E. Truss
 - 1. The truss shall be designed and constructed of structural steel shapes to safely carry the entire load of the escalators including all parts, together with the full capacity load, including the weight of the exterior balustrading and truss covering as specified and shown on the drawings.
 - a. Design truss for a step loading of 300 pounds and a truss deflection of 1/750 of support-to-support distance.
 - b. Design truss of escalators to eliminate the need for an intermediate support.
 - 2. Design the truss to carry the drive machine and controller. The entire truss shall have a factor of safety in accordance with the requirements of the code.
 - 3. Design and reinforce the truss for the specified rise without intermediate support.

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4. Provide oil-tight galvanized steel drip pan to the underside of the truss, and along the entire length and width of the truss. Design drip pan with sufficient rigidity to support a worker.
5. Apply not less than two (2) coats of rust-inhibiting paint or equivalent material protection.
6. Where the truss construction includes a structural steel plate bottom section, provide a separate drip pan under the entire length of each step chain. Manufacturer drip pans shall be from galvanized 14 gauge steel.
7. Design and construct the truss to permit cladding of sides of the truss and the soffit that shall weigh not more than 8.0 pounds per square foot.

F. Tracks

1. The tracks upon which the step rollers travel shall be constructed of drawn steel and shall be installed and supported to insure correct alignment and smooth operation of the running gear under all conditions in both directions of travel. All tracks shall have a smooth finish surface and shall have means provided to positively insure the forming of the step before the specified incline and flattening of the step pallet to the combplates.
2. The tracks shall be set up to provide for two (2) flat steps at the bottom and top prior to the 30° transition.

G. Step Chains

1. One (1) step chain shall be located on either side of the steps and shall be of the endless roller type.
2. The chains shall be made of high grade steel links with hardened pins and rollers designed to accurately and quietly engage the drive sprockets to ensure a smooth, quiet operation.
3. Provision shall be made to prevent sagging or buckling of the chains, to prevent the steps from coming in contact with each other, and to maintain substantially constant distances between axles of all exposed steps. Provide a tensioning device to maintain the proper tension on the chains.
4. These chains shall have a factor of safety of at least 5.

H. Steps

1. The step frame shall be integral with the treads and shall be made of aluminum suitably reinforced and braced to carry a maximum load per step under eccentric loading condition without distortion.
2. The width, depth and clearance of the steps shall be as outlined in the Code.
3. Provide ball or roller type rollers with a minimum diameter of 3" and a minimum width of 1".
 - a. The rollers shall be the dust-proof, self-aligning and self-lubricating type. Mount rollers for smooth, quiet operation and for easy removal.
4. The design of the steps and their attachments shall permit the steps to be removed without disturbing the balustrades or dismantling any part of the chains.

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I. Step Treads

1. The step treads and step frame shall be integral and shall be of die cast aluminum, cleat type, of a design to afford the best possible foothold.
2. The tread surface of the step shall be slotted in the direction parallel to the travel of the steps.
3. Each slot shall be not more than 1/4" wide and not less than 3/8" deep.
 - a. The distance from the center line to center line of adjacent slots shall be not less than 3/8".
 - b. The maximum clearance between step treads on the horizontal run shall be 1/8".
4. The clearance on either side of the steps between the steps and adjacent skirt panel shall be not more than 1/8" and the sum of the clearances on both sides shall be not more than 5/16". This requirement applies even with top and bottom skirt safety switches.
5. The step tread sides and rear shall have manufacturer's standard yellow plastic inserts or 1" (25 mm) wide strip of International Yellow paint. The paint shall be Kynar or an equally approved durable paint.
6. The vertical curved step riser on each step shall be of die cast aluminum, with the face having grooves that mesh with the treads of the adjacent step during step formation to prevent objects from becoming engaged between the riser and step in the transition of a fully formed step to the flattened surface entering the combplate at the top or bottom of the escalator.

J. Combplates

1. The combplates shall have a skid-reducing surface except for the comb areas.
2. The comb shall have closely spaced teeth arranged so that the pallets shall pass between them with minimum clearance.
3. The comb teeth shall be made in sections so that any damaged or worn sections can be readily replaced without disturbing the main combplate.
4. The comb teeth shall be formed to correspond to the form of treads to obtain uniform side clearances.
5. The combplates shall be adjustable both horizontally and vertically.

K. Handrail Guides and Handrails

1. The handrail guides shall be of steel or other alloy of proper rigidity and shall be shaped to allow easy movement of the handrail.
 - a. Shape guides to prevent the handrail from being easily thrown off.
2. The handrail shall be constructed of laminated canvas and rubber, properly vulcanized. The splice shall be vulcanized to produce a smooth, continuous surface.
3. The handrail shall be properly shaped to fit the guide track of the handrail guide.
4. The handrails shall be synchronized to move in the same direction and at the same speed on the steps.

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5. The handrails shall extend at least 12" beyond the combplate teeth at the same height before starting its turn.
6. Hand or finger guards shall be provided at the point where the handrail enters the balustrades.

L. Floor Plates

1. Provide full width landing and floor plates to cover the entire area of the landings within the outline of the truss and shall be supported by the truss.
2. Furnish access in the form of counterbalanced manholes or removable covers at the upper end over the machinery spaces.
 - a. If access is required at the lower end by local codes, local inspectors or by the escalator manufacturer, it shall be the manufacturer's responsibility to supply such access similar in design to the access at the upper end.
3. Upper and lower landing floor plates shall be stainless steel and reinforced not to deflect more than 1/8" under a point load of 250 pounds.

M. Balustrading

1. Provide the skirt panels, inside and outside deck boards and moldings, to match the finishes as hereinafter specified.
2. The balustrading shall be of the slimline type, with extended newels at upper and lower landings.
3. The skirt panels shall be stainless steel with a 1/16" thick Teflon coating and rigidly reinforced and arranged for positive and permanent adjustment.
4. The inner and outer deck boards shall be flat, stainless steel with a No. 4 finish.
5. Align all panel and deck board joints with the balustrade joints at intervals approved by the Architect.
6. The inside paneling shall be fully tempered clear glass, manufacturer's recommended thickness with vertical butt joints without separating mullions.
7. Anti-slide knobs: Provide 2" diameter, 3/4" high anti-slide knobs of material matching deck boards. Mount knobs 24" on center with concealed fasteners.

N. Deck Barrier Guards

1. Provide solid protective guards between balustrades and between balustrade and the adjoining structure.
2. The guards shall be in a design, material and finish as selected by the Architect.
3. Provide 1/2" thick laminated glass solid protective guards between balustrades and between balustrade and the adjoining structure with stainless trim and mounting hardware as directed by the Architect

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O. Wedging Guards

1. Provide wedging guards in accordance with the Code in a material and finish as selected by the Architect

P. Caution Signs

1. Post caution signs as directed by the Architect near the entrances of the units.
2. The signs shall be a durable material, in the form of pictographs and shall be 4" wide by 7 3/4" high.

Q. Provisions for Equipment Lubrication

1. Provide each moving part of the escalator installation with a self-oiling bearing with provisions for greasing or with grease-gun connections suited to a pressure gun for distributing heavy oil or light grease.
2. All grease gun connections shall be of the same type to fit the gun.
3. All points of lubrication shall be readily accessible.

R. Broken Drive and Drive Chain Emergency Brake

1. If a machine to step drive chain sprocket is used, a mechanically applied emergency brake shall be provided on the top sprocket shaft that shall automatically engage and safely stop a loaded escalator if the drive chain breaks.
2. If the drive chain breaks, a mechanically applied emergency brake shall be automatically engaged to bring the unit to a smooth and safe stop.

2.5 WIRING AND ELECTRICAL SAFETY DEVICES

A. Wiring and Disconnect

1. Provide all necessary wiring for the proper operation of the equipment, beginning at the power outlets. All wiring shall be SO type hard service cord wiring and shall meet the requirements of the Electrical Code.
2. Run all conductors in steel conduit or electrical metallic tubing within the truss.
3. Adequately support and fasten conduit, flexible metal conduit and wiring so that they do not come in contact with the components in motion.
4. Provide a fused disconnect or circuit breaker switch of the proper amperage next to the controller. The disconnecting means shall be lockable in the "open" position.
5. All wiring must test free from short circuit or grounds and the insulation resistance between conductors, and conductors and ground shall be at least one megohm.
6. Mark all connections and wires by numbered adhesive waterproof labels.
7. Provide a step-up or step-down transformer in the truss as necessary based on the given power supply voltage.

B. Emergency Stop Station

1. Provide a red stop button at the top and bottom landing where directed by Code.

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- a. Enclose the button with a lift-up 1/4" thick plastic cover.
 - b. When the cover is lifted an audible alarm shall sound with an intensity of 80 dBA minimum at the button location.
 - c. Cover markings shall conform to the requirements of the Code.
2. Locate the stop button in the newel, provide clearly and permanently identified switch positions.
3. The operation of the switch shall cause the disconnection of the power supply from the driving machine.
4. Arrange the controls to automatically shut down the escalator upon receiving alarm signal from smoke detectors, water flow switches and other safety devices as described by Code.

C. Broken Chain Safety Devices

1. Provide broken chain safety device with electric contacts which shall open and cause the service brake to be applied.
2. The device shall operate when:
 - a. One or both chains break.
 - b. The tension on the chains drop below or exceed a predetermined value.
3. Opening of these contacts shall remove power from the driving machine and set the brake bringing the escalator to a smooth and safe stop within one (1) tread length.

D. Starting Stations

1. Provide a start switch mounted fixture located at the upper and lower landings as directed by Code.
 - a. The switch shall be of the spring return key type, and monetary movement in either direction shall determine the direction of travel.
2. The start switch shall be interconnected through the controller so that the moving walk is brought to a complete stop before direction of travel can be changed.

E. Non-Reversing Device

1. Should the unit attempt to reverse while operating in either direction, the non-reversing device shall remove power from the driving machine and apply the service brake to bring the escalator to a smooth and safe stop within one (1) tread length.

F. Skirt Safety Switches

1. Provide safety switches on each side of the unit.
2. If an obstruction occurs, between the edge of the steps and the skirt panel, actuation of any one of the switches shall remove the power from the driving machine and apply the service brake.
3. The switches shall be effective for either direction of travel and shall not have their efficiency impaired by dirt or dust.

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4. Actuation of the switch closest to the combplate shall cause the unit to stop before the obstruction reaches the combplate.

G. Slack Handrail Device

1. Provide a safety device with an electrical switch to cut off the power to the driving machine and bring the unit to a smooth and safe stop should either handrail break or should the tension change from a predetermined value.
2. Operation of this device shall sound an audible alarm without any delay.

H. Handrail Speed Monitoring Device

1. Provide a safety device with an electrical switch to cut off the power to the driving machine and bring the unit to a smooth and safe stop should the handrail speed vary from the step speed by 15% or more.
2. Operation of this device shall sound an audible alarm without any delay.

I. Handrail Entry Device

1. A handrail entry device shall be provided at each newel.
2. It shall be operative in the newels in which the handrail enters the balustrade.
3. It shall be of the manually reset type and shall cause the unit to stop by removing power from the driving machine motor and applying the brake.
4. It shall operate in either of two ways:
 - a. If an object becomes caught between the handrail and the handrail guard.
 - b. If an object approaches the area between the handrail and the handrail guard.
5. For those units that rely on an opening of the balustrade to prevent entrapment, all handrail entry devices shall be operative whenever the handrails are operating.

J. Combplate Impact Device

1. Provide a dual acting combplate safety switch on both ends of the unit.
2. The switch shall actuate and stop the unit if the combplate is subject to a horizontal or a vertical force as prescribed by the Code.

K. Missing Step Device

1. Provide a device to detect a missing step.
2. When operated, the device shall bring the unit to a stop before the missing section becomes exposed.

L. Step Level Device

1. Step level devices shall be located at the top and bottom of the escalator.
2. These devices shall detect downward displacement of 3 mm (0.125 in.) or greater at the riser end at either side of the step.

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3. When activated, the device shall cause the escalator to stop before the step enters the combplate.
4. The device shall cause power to be removed from the driving-machine motor and brake.
5. Devices shall be of the manual-reset type.

M. Step Upthrust Device

1. Means shall be provided to cause the electric power to be removed from the driving-machine motor and brake should a step be displaced against the upthrust track at the lower curve in the passenger-carrying line of the track system.

2.6 SIGNAL EQUIPMENT

A. Demarcation Lights

1. Locate a demarcation light below the steps at the entrance and exit of the unit so that the break in the steps is clearly visible as they start to form.
2. The demarcation lights shall consist of two (2) fluorescent fixtures and shall be mounted perpendicular to escalator travel.

2.7 Installation

- A. Isolate escalators to reduce transmission of vibration to adjoining structure. The noise level will not exceed 55 dBA measured 3'-0" above the upper landing combplate.
- B. Reinforce landing plates to not allow more than 1/16" deflection when a load of 250 pounds is applied to any 18" by 18" area.

2.8 EXAMINATION

A. Inspection

1. Study the Contract Documents with regard to the work as specified and required so as to ensure its completeness.
2. Examine surface and conditions to which this work is to be attached or applied and notify the Owner in writing if conditions or surfaces are detrimental to the proper and expeditious installation of the work. Starting the work shall imply acceptance of the surfaces and conditions to perform the work as specified.
3. Verify, by measurements at the job site, dimensions affecting the work. Bring field dimensions which are at variance with those on the accepted shop drawings to the attention of the Owner. Obtain the decision regarding corrective measures before the start of fabrication of items affected.
4. Cooperate in the coordination and scheduling of the work of this section with the work of other sections so as not to delay job progress.

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5. Bidders are to provide rigging details for the movement of the escalator equipment. Rigging details are to include any coordination or phasing with other work being completed in the project area.

2.9 INSTALLATION / PROJECT PHASING

A. Installation

1. Install new escalators, using skilled personnel in strict accordance with the final accepted shop drawings and other submittals.
2. Comply with the code, manufacturer's instructions and recommendations.
3. Coordinate work with the work of other building functions for proper time and sequence to avoid delays and to ensure right-of-way of system. Use lines and levels to ensure dimensional coordination of the work.
4. Accurately and rigidly secure supporting elements within the wellways to the encountered construction within the tolerance established.
5. Provide and install motor, switch, control, safety and maintenance and operating devices in strict accordance with the submitted wiring diagrams and applicable codes and regulations having jurisdiction.
6. After installation, touch up in the field, surfaces of shop primed elements which have become scratched or damaged.
7. Lubricate operating parts of system as recommended by the manufacturer.

2.10 FIELD QUALITY CONTROL

A. Inspection and Testing

1. Upon completion of each work phase or individual escalator specified herein, the Contractor shall, at its own expense, arrange and assist with inspection and testing as may be required by the A.H.J. in order to secure a Certificate of Operation.

B. Substantial Completion

1. The work shall be deemed "Substantially Complete" for an individual unit or group of units when, in the opinion of the Consultant, the unit is complete, such that there are no material and substantial variations from the Contract Documents, and the unit is fit for its intended purpose.
2. Governing authority testing shall be completed and approved in conjunction with inspection for operation of the unit; a certificate of operation or other required documentation issued; and remaining items mandated for final acceptance completion are limited to minor punch list work not incorporating any life safety deficiencies.
3. The issuance of a substantial completion notification shall not relieve the Contractor from its obligations hereunder to complete the work.
4. Final completion cannot be achieved until all deliverables, including but not limited to training, spare parts, manuals, and other documentation requirements, have been completed.

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C. Contractor's Superintendent

1. The Contractor shall assign a competent project superintendent during the work progress and any necessary assistant, all satisfactory to the Owner. The superintendent shall represent the Contractor and all instructions given to him shall be as binding as if given to the Contractor.

2.11 PROTECTION / CLEANING

A. Protection and Cleaning

1. Adequately protect surfaces against accumulation of paint, mortar, mastic and disfiguration or discoloration and damage during shipment and installation.
2. Upon completion, remove protection from finished surfaces and thoroughly clean and polish surfaces with due regard to the type of material. Work shall be free from discoloration, scratches, dents and other surface defects.
3. The finished installation shall be free of defects.
4. Before final completion and acceptance, repair and/or replace defective work, to the satisfaction of the Owner, at no additional cost.
5. Remove tools, equipment and surplus materials from the site.

2.12 DEMONSTRATION

A. Performance and Operating Requirements

B. Acceptance Testing

1. Comply with the requirements of Division 01.
2. The Contractor shall provide at least five (5) days prior written notice to the Owner and Consultant regarding the exact date on which work specified in the Contract Documents will reach completion on any single unit of vertical transportation equipment.
3. In addition to conducting whatever testing procedures may be required by local inspecting authorities in order to gain approval of the completed work, and before seeking approval of said work by the Owner, the Contractor shall perform certain other tests in the presence of the Consultant.
 - a. Bi-directional travel speeds.
 - b. Ride quality and noise levels.
 - c. Handrail tracking.
 - d. Operation of fault finder and/or remote monitoring.
4. The Contractor shall provide at least five (5) days prior written notice to the Owner and Consultant regarding the exact date on which work specified in the Contract Documents will reach completion on any single unit of vertical transportation equipment.
5. In addition to conducting whatever testing procedures may be required by local inspecting authorities in order to gain approval of the completed work, and before seeking approval

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of said work by the Owner, the Contractor shall perform certain other tests in the presence of the Consultant.

6. The Contractor shall provide test instruments, test weights, and qualified field labor as required to safely operate the unit under load conditions that vary from empty to full rated load and, in so doing, to successfully demonstrate compliance with applicable performance standards set forth in the project specifications with regard to:
 - a. Operation of safety devices.
 - b. Ride quality of the escalator.
7. Upon completion of work specified in the Contract Documents and in conjunction with the aforementioned testing procedures, the Contractor shall carry out additional testing of control features in the presence of the Consultant.

C. Adjustment/Balance

1. Make necessary adjustment of equipment to ensure escalators operate smoothly and quietly.

D. Escalator Performance Requirements

1. The escalators shall meet the following performance requirements:
 - a. Speed: Within 95% to 105% of rated speed under any loading condition in both directions of travel.
 - b. Step/Skirt Performance Index: Within the limits outlined in the applicable Code.
 - c. Handrail Tracking: Equal to step movement throughout the length of the escalator.
2. Provide necessary sound isolation so that the noise level does not exceed 55 dBa measured three (3) feet above the combplate.
3. When stopping, deceleration with brake shall not exceed 3.0 ft/sec².
4. The Contractor shall provide test instruments and qualified field labor as required to successfully demonstrate:
 - a. The back-up operating mode for group dispatch failure
 - b. Simulated and actual emergency power operation
 - c. Firefighter, attendant and independent service operations
 - d. Restricted access security features and card reader controls
 - e. Zoning operations and floor parking assignments
 - f. Up/down peak operation
5. After hour tests of systems such as skirt index and brake torque test shall be conducted at no extra cost to the Owner.

END OF SECTION