PROJECT MANUAL
FOR

Of Store 2654
Kings Mountain, NC

ARCHITECT / ENGINEER

YCH ARCHITECTS
7035 Northwinds Dr., NW
Concord, NC 28027

BOWERS CONSULTING, PA
Engineer – Fire Protection/Plumbing/HVAC
1620 South MLK Jr. Avenue
Suite 106
Salisbury, NC 28144

STURGILL ENGINEERING
Engineer - Electrical
1 South Main Street
Lexington, NC 27292

TAYLOR & VIOLA STRUCTRUAL ENGINEERS
Engineer – Structural
308 15th Street SE
Hickory, NC 28602

September 20, 2024

Volume 08

FOOD LION
Post Office Box 1330
Salisbury, North Carolina 28145
Telephone 704-633-8250

NOTE: These specifications are provided by Food Lion, for the benefit of its subsidiaries, including but not limited to, Food Lion, LLC. The specifications are to be used to facilitate the construction of the project without alterations, except as noted herein. References herein to "Food Lion" shall include the applicable corporate subsidiary of a specific project. It is the responsibility of the Architect and Engineer to supplement these specifications as necessary to coordinate the "Site Layout Criteria", standard store plans of the model store being built, and applicable codes, creating a supplemental project manual for each specific project."

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2/9/2017 – Volume 05 – General Revisions
5/14/2018 – Volume 06 – General Revisions
3/7/2019 – Volume 07 – General Revisions
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This section includes the Professional seals by Design Professionals and others responsible for preparing the Construction Documents.

ARCHITECTURAL: SEAL LOCATION:

NAME: ____William T. Hughes, AIA_____
(print)

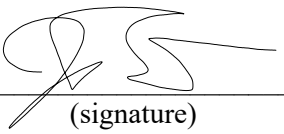
_____
(signature)

_____8247_____
(professional number)

STRUCTURAL :

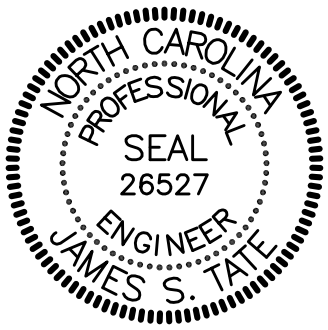
SEAL LOCATION:

NAME: James S. Tate
(print)



(signature)

26527
(professional number)



PLUMBING AND
MECHANICAL HVAC
ENGINEER:

SEAL LOCATION:

NAME: MICHAEL D. BOWERS
(print)

Michael D. Bowers
(signature)

21539
(professional number)

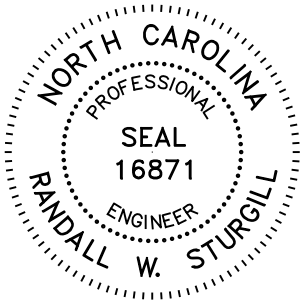
ELECTRICAL
ENGINEER:

SEAL LOCATION:

NAME: RANDALL W. STURGILL
(print)

(signature)

16871
(professional number)



This project will be bid through the Food Lion project management site, PMWeb https://rbs.pmweb.com/PMWeb

For questions or support, contact:

Shana Hines at (704) 310-4218
Or Shana.Hines@RetailBusinessServices.com

PIN #: N/A
Contract #: FL Store #
Project:

CONSTRUCTION CONTRACT

THIS CONSTRUCTION CONTRACT is made and entered into as of «Effective_Date», ("Effective Date") by and between **Food Lion, LLC**, a North Carolina limited liability company (hereinafter called "**Owner**"), and **«Vendor»** , (hereinafter called "**Contractor**").

FOR VALUABLE CONSIDERATION, including the mutual promises hereinafter set forth, Owner and Contractor hereby agree as follows:

ARTICLE 1. THE CONTRACT AND PROJECT

1.1. CONTRACT DOCUMENTS. This "Contract" is comprised of this Construction Contract and the Drawings and Specifications, Scope of Work (if any), Conditions of the Contract (General, Supplementary, Special and other Conditions), and any Addenda issued prior to execution of this Contract that are identified on the List of Contract Documents attached hereto as **SCHEDULE A**, all of which documents (the "Contract Documents") are incorporated in and form a part of this Contract.

1.2. PROJECT AND WORKSITE. This Contract relates to work and services to be provided by Contractor with respect to Remodel of store «Store_Number» (the "Project"), located at «Address», «City»,«State» (as defined below the "Worksite"). Owner either owns or leases the real property comprising the Worksite.

1.3. DEFINITIONS. In addition to other words and phrases defined throughout this Contract, the following capitalized (except as indicated) words and phrases shall have the following meanings:

1.3.1. Contract Price. The "Contract Price" referenced in Article 5.1 and elsewhere in this Contract is «Written» ($«Numeric»). The Contract Price includes the cost of the Work and all applicable Sales Taxes, except Sales Taxes payable by Owner, if any, for North Carolina Projects as provided in Article 5.2.2.

1.3.2. Contract Time. The "Contract Time" is the period specified in Article 4 for performing the Work, with the following scheduled dates, subject to adjustments as provided herein:
- The "Commencement Date" of the Work shall be «Commencement» .
- The "Scheduled Substantial Completion Date" shall be «Substantial_Completion» .
- The "Scheduled Final Completion Date" shall be one hundred twenty (120) days after Substantial Completion, unless specified in a Punch List approved under Article 8.1.

1.3.3. Defective Work. "Defective Work" includes any portion of the Work found to not be in conformance with the Contract Documents.

1.3.4. Drawings and Specifications. "Drawings" are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, including plans, elevations, sections, details, schedules and diagrams; and "Specifications" are the portions consisting of written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

1.3.5. Complete. The term "complete" (or variations) shall mean complete with all connections, supports, attachments, and incidental items necessary for a finished and properly operating assembly or installation.

1.3.6. Owner Related Parties and Authorized Representatives. "Owner's Related Parties" shall include Owner and its affiliates and their officers, directors, members, agents and employees. Ahold Delhaize USA Services, LLC ("ADUSA") is an affiliate of Owner and its agent for purposes of administering this Contract. The only persons authorized to issue approvals and bind Owner with respect to this Contract are (i) officers of Owner and ADUSA, and (ii) the person designated "Owner's Representative" on the last page hereof or hereafter so designated in writing by an officer of Owner or ADUSA.

1.3.7. Provide. The term "provide" (or variations) shall mean furnish, fabricate, erect, and completely install, including all necessary labor and incidental materials so that the referenced or described item is complete in place and ready for use or operation.

1.3.8. Subcontractor. A "Subcontractor" is a person or entity who has a direct contract with Contractor to perform a portion of the Work or supply materials or both; and unless the context requires otherwise, the term "Subcontractor" excludes separate contractors and subcontractors of separate contractors.

1.3.9. Substantial Completion. "Substantial Completion" is defined in Article 8.1 hereof.

1.3.10. Work. The "Work" includes all labor, materials, equipment, construction and services required of Contractor by the Contract Documents, including all incidental work reasonably inferable from the Contract Documents as being necessary to produce the indicated results. The Work may constitute the whole or part of Owner's Project.

1.3.11. Worksite. The location of the Project identified above, including the building and adjacent parking and exterior areas.

ARTICLE 2. SCOPE OF CONTRACTOR'S SERVICES

2.1. GENERAL RESPONSIBILITIES.

2.1.1. Contractor shall provide all labor, materials, tools, equipment and services necessary to complete the Work, all of which shall be provided in a good, substantial and workmanlike manner in full accordance with the Contract Documents.

2.1.2. Contractor shall be responsible for the supervision and coordination of the Work, including the construction means, methods, techniques, sequences and procedures utilized, unless the Contract Documents give other specific instructions.

2.1.3. Contractor shall perform the Work in compliance with all applicable laws, statutes, building codes, rules, regulations, ordinances, and lawful orders of all public (and quasi-public) authorities having jurisdiction over the Project. Without limitation, Contractor shall adhere strictly to all regulations under the Federal Occupational Safety and Health Act (OSHA).

2.1.4. Contractor shall post and give all notices required of it by public (and quasi-public) authorities relating to the Project.

2.1.5. In order to facilitate its completion of the Work in accordance with the Contract Documents, prior to commencing the Work, Contractor shall examine and compare the Contract Documents with information furnished by Owner, relevant field measurements made by Contractor, and any visible conditions at the Worksite.

2.2. BUILDING PERMITS, FEES AND APPROVALS. Except for permits and fees that are Owner's responsibility pursuant to this Contract, Contractor shall obtain and pay for all necessary permits, licenses and renewals pertaining to the Work. Contractor shall provide Owner with copies of all such permits, licenses and renewals and all related notices upon their receipt.

2.3. CONTRACTOR'S PERSONNEL AND SUPERINTENDENT.

2.3.1. Contractor shall employ qualified individuals and/or contract with approved Subcontractors who are skilled in the tasks assigned to them and capable of working harmoniously with all trades, crafts and other individuals at the Worksite. Contractor shall ensure all employees and subcontractors at the Work Site comply with all rules and regulations applicable to access to or the conduct of work at the Worksite as set forth on any Addenda attached hereto, or otherwise promulgated from time to time by Owner.

2.3.2. Contractor shall employ a competent manager experienced in supermarket construction to oversee the Work, represent Contractor, and serve as its primary contact with Owner and its agents (the "Superintendent"). The Superintendent shall be present at the Worksite at least daily during performance of the Work. Communications given by or to the Superintendent shall be as binding as if given by or to Contractor.

2.3.3. Contractor shall enforce strict discipline and good order among its employees and others performing the Work. Upon request of Owner, Contractor shall remove any worker who in Owner 's judgment is unqualified or unacceptable. Contractor shall be responsible for labor difficulties at the Worksite resulting in work stoppages, delays or increased costs, provided in no event shall Contractor be relieved from its obligation to perform the Work in accordance with all requirements of this Contract by reason of labor difficulties.

2.4. SUBCONTRACTORS.

2.4.1. Owner reserves the right to reject any Subcontractor proposed by Contractor at any time before the Subcontractor commences its portion of the Work. Contractor shall submit a list of all Subcontractors to Owner upon acceptance of this Contract, and shall submit an updated list as and when necessary so that each Subcontractor is identified to Owner at least 72 hours before the Subcontractor commences its portion of the Work and so that Owner has an opportunity to reject any unacceptable Subcontractor and has a complete and accurate list of Subcontractors at all times.

2.4.2. Contractor shall enter into written contracts with its approved Subcontractors, consistent with and subject to this Contract. Without limitation, such contracts shall include provisions whereby the Subcontractor acknowledges and agrees that: (a) it has reviewed and will abide by the applicable terms, conditions and requirements of this Contract,

including the dispute resolution procedures in Article 12; and (b) Owner is a third-party beneficiary and conditional assignee of the contract, such that in the event of default or termination of this Contract, it will perform the contract services for Owner, but only upon written request of Owner; otherwise, Owner shall have no liability for payment to such Subcontractors. Prior to execution of such contracts, Contractor shall make available to its Subcontractors a copy of the pertinent portions of the Contract Documents to which they will be bound, and shall require that they similarly furnish the pertinent portions to their respective subcontractors.

2.4.3. Owner shall have the right to require Contractor to remove any Subcontractor that Owner determines is unqualified to perform the Work, provided that if such removal is without cause and materially affects the cost of the Work to Contractor or the time required for its performance, an equitable adjustment shall be made in a Change Order.

2.5. COOPERATION WITH WORK OF OWNER AND OTHERS

2.5.1. Owner may perform other work at the Worksite directly or indirectly by separate contractors. In such event, Contractor and Owner shall coordinate their respective activities and agree upon fair and reasonable schedules and operational procedures for Worksite activities. Owner shall require its separate contractors to cooperate with Contractor and assist with the coordination of activities and the review of construction schedules and operations.

2.5.2. Contractor shall (a) proceed with the Work in a manner that does not delay or interfere with the separate work of Owner or others or cause such separate work to become defective, (b) afford Owner or others reasonable access for introduction and storage of their materials and equipment and performance of their activities, and (c) coordinate the other's construction and operations with Contractor's as required by this Article.

2.5.3. Before proceeding with any portion of the Work that is affected by the work or operations of Owner or others, Contractor shall give Owner prompt written notice of any defects Contractor discovers in their work which will prevent the proper execution of the Work. Upon receipt of such notice, Owner shall promptly inform Contractor what action, if any, Contractor shall take with regard to the defects. If Contractor does not notify Owner of patent defects or conditions interfering with the performance of the Work, Contractor acknowledges that such conditions are acceptable for the proper execution of the Work.

2.6. SAFETY, ACCIDENTS, AND INJURIES. Contractor shall have overall responsibility for maintaining and supervising safety precautions and programs in connection with the performance of the Work and other work activities at the entire Worksite, unless otherwise specified in the Contract Documents. Without limitation Contractor shall post and give all notices required by law with respect to safety. Contractor shall seek to avoid injury, loss or damage to persons or property by taking reasonable steps to protect its employees and other persons at the Worksite, materials and equipment stored at on-site or off-site locations for use in the Work, and other property located at and adjacent to Work areas (whether or not the property is part of the Work). Contractor shall file with Owner's Representative, within 24 hours of its occurrence, a report of any accident or injury to employees, Subcontractors or customers on the Worksite, including an investigative report, pictures of the accident or injury, and information regarding any hospital,

doctor or medical reports.

2.7. MATERIALS BROUGHT TO THE WORKSITE. Contractor shall be responsible for the proper delivery, handling, application, safety, storage, security, removal and disposal of all materials and substances brought to the Worksite by Contractor in accordance with the Contract Documents and used or consumed in the performance of the Work.

2.8. SUBMITTALS. Contractor shall prepare and submit to Owner or its designee, for review and approval, all shop drawings, samples, product data and similar submittals required by the Contract Documents ("Submittals"), if any, and shall perform all Work strictly in accordance with approved Submittals. All Submittals shall be in conformity with the Contract Documents and Schedule of the Work so as not to delay performance of the Work or the work of Owner and others. Owner's (or its designee's) review of Submittals is for the limited purpose of confirming general conformance with the Drawings and Specifications and not for determining accuracy or completeness of any details or compliance with laws. Owner's approval shall not relieve Contractor from responsibility for Defective Work resulting from errors or omissions of any kind on the approved Submittals, and shall not be deemed to authorize any substitutions or changes in the Contact requirements, unless the same are each specifically and clearly identified in the Submittal as a change. In such case, Contractor shall also specify any credits to be given to Owner (if warranted) for such changes. Owner's approval shall be in writing (otherwise it shall be deemed withheld), and shall be given in a timely manner to avoid causing delay, or within 5 days of receipt of the Submittal if an immediate response has been requested in writing.

2.9. SITE CONDITIONS. If subsurface or other physical conditions at the Worksite are materially different from those indicated in the Contract Documents, Contractor shall give Owner immediate written notice of the condition. Contractor shall not be required to perform any work relating to such different conditions without written mutual agreement of the parties.

2.10. CUTTING, FITTING AND PATCHING. Contractor shall perform cutting, fitting and patching necessary to coordinate the various parts of the Work and to prepare its Work for the work of Owner or others retained by Owner.

2.11. DUST, DEBRIS AND CLEAN UP. Contractor shall minimize and confine dust and debris resulting from construction activities and shall regularly remove debris and waste materials resulting from the Work so as to prevent unsafe conditions and interference to Owner's other work and operations. Upon completion of the Work in any area and upon final completion, Contractor shall promptly clean the area or Worksite (as applicable) and remove its construction equipment, tools and machinery, and all debris, waste and surplus materials.

2.12. ENVIRONMENTAL COMPLIANCE. Contractor shall lawfully dispose of all waste and debris and shall not release or permit the release of any Hazardous Materials in any manner that would have an adverse effect on Owner's operations or property, public health or the environment generally. "Hazardous Materials" shall include, without limitation, any hazardous or toxic substance, waste, pollutant, or any other substance regulated under any federal, state or local environmental or safety statute, rule, regulation, ordinance or order; and "release" shall include, without limitation, any spill, leak, emission, discharge, disposal, migration or other movement of contaminants into the indoor or outdoor environment including through the air, soil, surface water, or groundwater.

ARTICLE 3. WARRANTY AND CORRECTION OF DEFECTIVE WORK

3.1. WARRANTY.

3.1.1. Contractor warrants that all materials and equipment incorporated in the Work shall be new unless otherwise specified, of good quality, in conformance with the Contract Documents, and free from defective workmanship and materials. Contractor further warrants that the Work will be free from material defects not intrinsic in the design or materials required in the Contract Documents.

3.1.2. Contractor shall obtain from its Subcontractors warranties identical to the warranties set forth in this Contract and any special or extended warranties required by the Contract Documents or otherwise available. After the general warranty period, Contractor shall assign all such special or extended warranties to Owner and provide reasonable assistance to Owner in enforcing the same.

3.2. CORRECTION OF WORK PRIOR TO FINAL COMPLETION. Contractor shall promptly commence to correct any Defective Work identified by Owner prior to Final Completion, and shall complete such correction within a reasonable time, at its own cost, without causing delay to other portions of the Work or to the work of Owner and others or to the Schedule of the Work. If Contractor fails to commence such correction within five (5) days after written notice from Owner, Owner may correct the Defective Work and perform such additional Work as may be necessary to maintain the Schedule of the Work on behalf of Contractor, and a Change Order shall be issued deducting the reasonable cost from the payments thereafter due Contractor. If payments thereafter due are not sufficient, Contractor shall pay the difference to Owner.

3.3. CORRECTION OF WORK AFTER FINAL COMPLETION. Contractor shall correct any Defective Work found within one (1) year after the date of Final Completion of the Work, or within one (1) year after discovery if it constitutes a latent defect that would not have been discovered by a reasonable inspection of the Work at the time of Final Completion, or within such longer period as may be specifically required by the Contract Documents. Promptly after written notice from Owner specifying the Defective Work, Contractor shall commence to correct or replace the Defective Work and any damage caused by the Defective Work. If Contractor fails to commence such correction within seven (7) days after such notice, then in addition to any other available remedies, Owner may elect to correct the Defective Work with its own forces; provided, however, that Owner shall not proceed to correct the Defective Work without first giving Contractor a second notice stating that Owner will correct the work itself, unless Contractor commences correction within seven (7) days after the second notice or such longer period as Owner may specify. Notwithstanding the forgoing, in case of emergency, Owner may proceed to correct the Defective Work without any prior notice. Contractor shall be responsible for all reasonable costs incurred by Owner in performing such correction. The one-year period for correction of Defective Work does not constitute a limitation period with respect to the enforcement of Contractor's other obligations under the Contract Documents

ARTICLE 4. CONTRACT TIME

4.1. TIME FOR COMPLETION OF THE WORK. Contractor shall commence the Work on the Commencement Date, except that Contractor shall not knowingly commence the Work before the required insurance is obtained. Contractor shall achieve Substantial Completion of the Work on

or before the Scheduled Substantial Completion Date, and Final Completion on or before the Scheduled Final Completion Date. The foregoing Contract dates are specified in Article 1.3. and are subject to adjustments as provided herein. Time is of the essence to this Contract.

4.2. SCHEDULE OF THE WORK.

4.2.1. Within ten (10) days after the Effective Date, Contractor shall submit to Owner a schedule of the Work showing the dates on which Contractor plans to commence and complete various parts of the Work, including the dates on which Submittals are required from Contractor and the dates any information and approvals are required from Owner ("Schedule of the Work"). On Owner's written approval of the Schedule of the Work, Contractor shall comply with it unless directed by Owner in writing to do otherwise. Contractor shall update the Schedule of the Work with each Application for payment or at appropriate intervals as required by the conditions of the Work and the Project.

4.2.2. Owner may determine the sequence in which the Work shall be performed. Owner may require Contractor to make reasonable changes in the sequence at any time during the performance of the Work in order to facilitate the performance of work by Owner or Others. To the extent such changes increase Contractor's costs and time, the Contract Price and Contract Time shall be equitably adjusted.

4.3. UNFORESEEN DELAYS. If Contractor is delayed at any time in the commencement or progress of the Work as a result of the acts or omissions of Owner or its separate contractors; labor disputes not involving forces employed by Contractor or its Subcontractors; fire caused by others; adverse weather conditions that cannot reasonably be anticipated; encountering unknown concealed Hazardous Materials or conditions; delay authorized by Owner pending dispute resolution and suspension by Owner, or by other cause beyond the reasonable control and anticipation of Contractor, then Contractor shall be entitled to an equitable extension of the Contract Time. If Contractor incurs additional costs as a result of delay caused by Owner, then Contractor shall be entitled to an equitable adjustment in the Contract Price, excepting adjustment for consequential damages. Claims for such extensions and adjustments shall be subject to Owner's receipt of notice of delay as provided below, and shall be processed as a Change Order promptly initiated by Contractor.

4.4. NOTICE OF DELAY. In the event delay to the Work is encountered for any reason, Contractor shall, within five (5) business days after it first recognizes the delay, provide written notice of the delay to Owner, including the cause of the delay and any claim for an equitable extension of the Contract Time and/or an equitable adjustment in the Contract Price resulting from the delay as permitted hereunder; otherwise, the delay shall be deemed acceptable and any claim for Contract extension or adjustment shall be deemed waived. Owner and Contractor agree to undertake reasonable steps to mitigate the effect of delays.

ARTICLE 5. CONTRACT PRICE

5.1. CONTRACT PRICE. Owner shall pay and Contractor shall accept, as full and complete payment for Contractor's timely and complete performance of its obligations hereunder, the "Contract Price" specified in Article 1.3.

5.2. SALES TAXES.

5.2.1. Contractor and its Subcontractors shall pay when due all federal, state and local sales, use and excise taxes (or similar levies) on all materials, tools, equipment, labor, and services furnished under this Contract (collectively, "Sales Taxes"), and upon request shall submit evidence to Owner that all such tax payments have been made. Contractor shall remain liable for any Sales Tax deficiencies, interest and penalties resulting from the failure of Contractor or its Subcontractors to properly comply with the foregoing.

5.2.2. Contractor acknowledges that for Projects in North Carolina ("North Carolina Projects"), Contractor is not required to collect Sales Taxes from Owner to the extent this Contract is a real property contract for capital improvements ("Capital Improvements"), but is required to invoice and collect Sales Taxes from Owner to the extent, *if any*, it is a contract for repair, maintenance and installation services not related to a capital improvement ("RMI Services"), as provided under applicable sales and use tax laws. Except for such Sales Taxes payable by Owner for RMI Services, all Sales Taxes are included in the Contract Price. For North Carolina Projects, Owner shall issue North Carolina Department of Revenue Form E-589CI ("Affidavit of Capital Improvement") to Contractor with respect to those portions of the Work that constitute Capital Improvements, and shall designate those portions of the Work, *if any*, that constitute RMI Services; provided that the parties shall work together in good faith to agree on a final classification and valuation of the Work as Capital Improvements and/or RMI Services upon submission of the Schedule of Values pursuant to Article 5.4. For North Carolina Projects, Contractor shall (i) execute and issue to its Subcontractors an Affidavit of Capital Improvement based on the foregoing classification of the Work, and execute any additional forms, affidavits and other documents that may be required for such classification; (ii) maintain in its books and records copies of all such Affidavits of Capital Improvement, invoices, purchase documents and other documents; (iii) specify on all Applications for payment the applicable Sales Taxes due from Owner (if any RMI Services); and (iv) submit to Owner, upon request, evidence that it is registered to collect Sales Taxes and that it has reported and remitted all such Sales Taxes.

5.3. ALLOWANCES. "Allowances" are sums stated in the Contract Documents for items that have not been selected and specified. The Contract Price includes the aggregate amount of all Allowances and any unit price items to be furnished or installed. Allowances shall include the costs of the materials, supplies and equipment delivered to the Worksite, less applicable trade discounts, plus requisite taxes; and unless specifically stated otherwise, shall also include unloading and handling at the Worksite and labor and installation. Contractor's overhead and profit for the Allowances shall be included in the Contract Price, but not in the Allowances. The Contract Price shall be adjusted by Change Order to reflect the actual costs when they are greater than or less than the Allowances.

5.4. SCHEDULE OF VALUES. Within ten (10) days after the Effective Date, Contractor shall prepare and submit to Owner a schedule of values apportioned to the various divisions or phases of the Work. Each line item in the schedule shall be assigned a value, and their total values shall equal to the Contract Price. For North Carolina Projects, such schedule shall include the classification and valuation of Capital Improvements and RMI Services pursuant to Article 5.2.2, and shall identify Sales Taxes, if any, payable by Owner on any RMI Services. Once approved by Owner, this schedule ("Schedule of Values") shall be used as a basis for reviewing applications for payment.

ARTICLE 6. PAYMENT

6.1. APPLICATIONS FOR PAYMENT. Contractor shall submit to Owner a monthly application for payment ("Application") no later than the 5th day of the calendar month requesting payment for labor and services rendered during the preceding thirty (30) calendar days. Submission of an Application shall constitute Contractor's warranty that all work described in such Application has been properly completed and that the title to such work, which will pass to Owner no later than the time of payment, is free and clear of all liens, claims, security interests or encumbrances. All Applications shall be itemized and supported by the Schedule of Values, applicable Change Orders, and any other substantiating data. Each Application shall contain such detail and be backed up with whatever supporting information Owner requests and shall at a minimum state:

(a) the total Contract Price, the previously invoiced amounts and credit payments made, and the total amount due under the Application, including applicable Sales Taxes thereon (for North Carolina Projects, if any), less any agreed retainage;

(b) an itemization of the labor, materials and equipment properly incorporated into the Project; and with respect to amounts invoiced for materials or equipment necessary for the Project and properly stored at the Worksite (or elsewhere if offsite storage is approved in writing by Owner), be accompanied by written proof that Owner has title to such materials or equipment and that such material and equipment is fully insured against loss or damage;

(c) the value of the completed portions of the Work in relation to the Contract Price, and any variance to the Schedule of Values; and

(d) Lien waivers, in the form attached hereto as **SCHEDULE B** or as otherwise required by Owner, from Contractor and each Subcontractor for any work and materials previously paid for by Owner.

6.2. PROGRESS PAYMENTS. Owner shall pay the amount due on any payment Application, less the permitted retainage, no later than thirty (30) days after Contractor has submitted a complete and accurate Application in accordance with Article 6.1 above. Contractor acknowledges that it must have submitted a completed IRS Form W-9 before payment can be processed by Owner.

6.3. RETAINAGE. Owner may retain from each progress payment made prior to Substantial Completion, ten percent (10%) of the amount otherwise due, which retainage amount may be reduced in Owner's sole discretion as the Work is completed.

6.4. ADJUSTMENT OF PAYMENT APPLICATION. Owner may adjust or reject a payment Application or nullify a previously approved Application, in whole or in part, as may be reasonably necessary to protect Owner from loss or damage to the extent that Contractor is responsible therefore under this Contract, based upon the following:

(a) Contractor's repeated failure to perform the Work as required by the Contract Documents;
(b) Loss or damage caused by Contractor for which Owner may be liable;
(c) Contractor's failure to properly pay Subcontractors following receipt of payment

from Owner;

(d) Defective Work not corrected in a timely fashion;

(e) Delay in performance of the Work such that the Work will not be completed within the Contract Time, and

(f) Reasonable evidence that the unpaid balance of the Contract Price is insufficient to fund the cost to complete the Work.

Owner shall give written notice to Contractor at the time of adjusting or rejecting an Application of the specific reasons therefore. When the reasons for withholding payment are removed, payment shall be made for the amounts previously withheld.

6.5. ACCEPTANCE OF WORK. Neither Owner's payment of progress payments nor its partial or full use or occupancy of the Project constitutes acceptance of any Work not complying with the Contract Documents.

6.6. PAYMENT OF SUBCONTRACTORS AND SUPPLIERS. Within fourteen (14) days after receipt of a payment from Owner, Contractor shall pay each of its Subcontractors out of the payment received the amount to which each Subcontractor is entitled on account of its portion of the Work (subject to the applicable retainage percentage). Owner shall have no obligation for payments owed to Contractor's Subcontractors. However, Owner reserves the right to make payment jointly to Contractor and to any of its Subcontractors if Owner reasonably believes Contractor may fail to pay the full amounts due them. Such joint check procedure shall not be deemed to commit Owner to repeat the procedure in the future.

6.7. FINAL PAYMENT. Contractor shall submit an Application for the unpaid balance of the Contract Price ("Final Payment") after full completion of the Work and all inspections, submission and processing of all Change Orders, and Owner's receipt of all close-out documentation and items required for Final Completion under Article 8.2.3 below. Within thirty (30) days after receipt of a complete and accurate Application for Final Payment, Owner shall make the Final Payment to Contractor. If Contractor fails to submit such Application within one hundred twenty (120) days after the date of Substantial Completion, then any and all applications for such Final Payment shall be deemed, and the same hereby are, waived and forever barred from collection by Contractor from Owner.

6.8. LIENS. Subject to payment as provided in this Article 6, Contractor shall promptly remove any liens filed against the Worksite premises or public improvement fund by any Subcontractor or other party performing labor or services or supplying materials in connection with the Work. If Contractor fails to take such action, Owner may remove the lien at Contractor's expense, including bond costs and reasonable attorney's fees.

ARTICLE 7. CONTRACT CHANGES

7.1. CHANGE ORDERS

7.1.1. No alterations or changes shall be made in the Work except upon the order of Owner, which alterations and changes shall be evidenced by a written "Change Order" signed by Owner and accepted by Contractor. Owner may, at any time, make changes in the drawings and specifications, omit certain work and/or require additional work to be performed by Contractor, and Contractor shall accept such Change Order requests so

long as the additional work is not outside of general scope of this Contract.

7.1.2. If a Change Order shall increase or decrease the cost of the Work to Contractor or materially affect the time required for its performance, an equitable adjustment shall be made in the Change Order. Owner and Contractor shall negotiate in good faith and as expeditiously as possible an appropriate adjustment. Acceptance of the Change Order and any adjustment in the Contract Price and/or Contract Time shall not be unreasonably withheld. In the event Owner and Contractor do not agree on an equitable adjustment as a result of a Change Order request, Owner may perform such change in the Work and other portions of the Work related thereto with its own forces or through separate contractors, with an equitable decrease in the Contract Price.

7.1.3. If any extra, additional or different work shall be executed by Contractor without previous written order by Owner, Owner shall be under no obligation to pay for such unauthorized work.

7.2. COST OR CREDIT FOR CHANGE ORDERS AND ALLOWANCES

7.2.1. With respect to Change Order requests involving any adjustment in the Contract Price, including adjustment for Allowances, Contractor shall (i) obtain from Subcontractors the best possible price quotations; (ii) review such quotations to ascertain whether they are reasonable; (iii) prepare an itemized accounting together with appropriate supporting data, including reasonable expenditures by, and savings to, those performing the Work involved in the proposed change; and (iv) provide a reasonable price quotation to Owner.

7.2.2. Change Orders, when issued and accepted, shall be full compensation or credit for the work added, omitted, or substituted. Contractor may receive a reasonable allowance for overhead and profit, consistent with overhead and profit in the Contract Documents, but in no event to exceed the following:

(a) for Contractor, (i) seven percent (7%) of Contractor's net cost for additional Work performed by Contractor's own forces, and (ii) seven percent (7%) of the amount due its Subcontractor for additional Work performed by the Subcontractor; and

(b) for a Subcontractor, (i) seven percent (7%) of the Subcontractor's net cost for additional Work performed by the Subcontractor, and (ii) seven percent (7%) of the amount due its sub-subcontractor for Work performed by its sub-subcontractor.

7.2.3. If price quotations for Change Order requests are determined by Owner to be unreasonable, Contractor shall provide additional back-up materials. If Owner still determines the quotation unreasonable, Owner may require the subject Work be performed on a time and material basis.

7.2.4. Contractor and its Subcontractors shall be allowed no additional compensation for any costs, fees or expenses incurred in performing services already required by this Contract, and shall not be entitled to additional reimbursement for home-office, other non-job-site or indirect overhead expenses, or tools necessary for construction.

7.3. CONTRACT DOCUMENT CHANGES AND AS-BUILT PLANS. Contractor shall keep at the Worksite a record set of the Drawings and Specifications which shall be kept marked up in detail to date to indicate alterations required by Change Orders or otherwise approved to suit field or other conditions, together with all Change Orders and other Contract Document changes, all of which shall be delivered to Owner at the conclusion of the Contract as a record of the Work as-built. In addition, Contractor shall furnish one (1) set of as-built plans to Owner in electronic form at the completion of this Contract and prior to Final Payment.

ARTICLE 8. COMPLETION OF WORK AND PROJECT CLOSE-OUT

8.1. SUBSTANTIAL COMPLETION. "Substantial Completion" means the Work is substantially complete so that Owner can occupy and use the Project for its intended purposes, and shall be deemed to have occurred on the later of (i) the date the Work passes a Substantial Completion inspection, (ii) the date Contractor delivers to Owner the Certificate of Occupancy and all keys, permits, and other necessary and customary documents and items required for Owner's occupancy, and (iii) the date a final "Punch List" is approved in accordance with the following:

8.1.1. Contractor shall notify Owner when it believes the Work is substantially complete and ready for a Substantial Completion inspection. Owner and Contractor shall then coordinate a date for such inspection. Prior to such inspection, Contractor shall furnish to Owner a draft punch list of all items remaining to be completed or corrected, together with a schedule for their completion or correction, and if required by the Contract Documents, a schedule for verifying and documenting the performance of all facilities, systems and assemblies in accordance with the Contract Documents.

8.1.2. At the inspection, Owner shall inspect the Work; approve Contractor's punch list and schedule with any additional items to be completed or corrected (as approved, the "Punch List"); and determine whether Substantial Completion of the Work has occurred. If Owner determines that Substantial Completion has not occurred, Contractor shall continue to prosecute the Work and the inspection process shall be repeated at no additional cost to Owner until the Work is determined to be substantially complete. Upon request of either party, Owner and Contractor shall execute a certificate establishing the date of Substantial Completion.

8.2. FINAL COMPLETION. "Final Completion" of the Work shall be deemed to have occurred on the later of (i) the date the Work passes a Final Completion inspection, and (ii) the date Contractor has submitted all required Final Completion (close-out) documentation and items, in accordance with the following:

8.2.1. Contractor shall notify Owner when it believes the Work is finally complete and ready for a Final Completion inspection. Owner and Contractor shall then coordinate a date for such inspection. At the Final Completion inspection, Owner shall inspect the Work and determine whether the Work is finally complete, including whether (i) all Punch List items have been satisfactorily completed and corrected; (ii) the Work complies with this Contract, including applicable building codes and installation and workmanship standards; and (iii) required inspections and approvals by governmental officials have been satisfactorily completed. Owner's inspection and determination of Final Completion are solely for the limited purpose of making final payment and shall not

relieve Contractor from responsibility for completing the Work as provided herein.

8.2.2. If the Work is not finally complete, Contractor shall continue to prosecute the Work, and the inspection process shall be repeated at no additional cost to Owner, until the Work is finally complete.

8.2.3. On or before the date of Final Completion, Contractor shall deliver to Owner the following Final Completion close-out documentation and items:

(a) all operating and instruction manuals not previously produced, and required maintenance stocks;

(b) one (1) set of as-built drawings and markups in electronic form, together with all shop drawings (sprinkler, fire, burglar, etc.);

(c) written consent of each surety (if any) to final payment;

(d) full, final and unconditional waivers of mechanics', materialmen's and construction liens on the Project property, and releases all claims, security interests or encumbrances, from each Subcontractor or other person who has or might have a claim against the Project property, Owner or Owner's property; provided that if a Subcontractor refuses to furnish a waiver or release, Contractor may furnish a bond or other security satisfactory to Owner;

(e) affidavit of Contractor with an unconditional certification that all of its obligations to its Subcontractors and other third parties for payment related to the Project have been paid or otherwise satisfied;

(f) all written warranties and guarantees relating to the labor, goods, materials, equipment and systems incorporated into the Work, endorsed, countersigned, and assigned as necessary;

(g) affidavits, releases, bonds, waivers, permits and other documents necessary for final close-out of the Work;

(h) a report of any accidents or injuries experienced or claimed by Contractor or its Subcontractors (including their employees, sub-subcontractors and agents) at the Worksite;

(i) a list of any items due but unable to be delivered and the reason for non-delivery;

(j) a certificate that all Sales Taxes have been paid; and

(k) any other documents reasonably and customarily required or expressly required herein for full and final close-out of the Work.

8.2.4. Owner will review and determine the sufficiency of all Final Completion close-out documentation and items submitted for Final Completion, and will promptly inform Contractor about any deficiencies and omissions.

8.3. FINAL PAYMENT BY OWNER. Upon satisfactory Final Completion as between Owner and Contractor, Contractor shall submit an Application for Final Payment as provided in Article 6.7 above.

ARTICLE 9. INDEMNIFICATION

9.1. INDEMNIFICATION. To the fullest extent permitted by law, Contractor shall indemnify, hold harmless and defend Owner and Owner's Related Parties from and against any and all liability, loss, claims, demands, suits, costs, fees and expenses (including actual fees and expenses of attorneys, expert witnesses, and other consultants), by whomsoever brought or alleged, and regardless of the legal theories upon which premised, including, but not limited to, those actually or allegedly arising out of bodily injury to, or sickness or death of, any person, or property damage or destruction (including loss of use), which may be imposed upon, incurred by or asserted against Owner or Owner's Related Parties allegedly or actually arising out of or resulting from the performance of Contractor's services and obligations under this Contract, including without limitation any violation of law, breach of contract, or negligent act or omission of Contractor, its Subcontractors, or their agents, sub-subcontractors, employees or servants.

9.2. WAIVER OF LIMITATIONS. To the fullest extent permitted by law, Contractor, for itself and for its Subcontractors, and the respective agents, employees and servants of each, expressly waives any and all immunity or damage limitation provisions available to any agent, employee or servant under any workers' compensation law, disability benefit law or other employee benefit law, to the extent such laws would otherwise limit the amount recoverable pursuant to the indemnification provision contained in this Article 9.

9.3. INTELLECTUAL PROPERTY RIGHTS. To the fullest extent permitted by law, Contractor shall indemnify, hold harmless and defend Owner and Owner's Related Parties from and against any and all liability, loss, claims, demands, suits, costs, fees and expenses (including actual fees and expenses of attorneys, expert witnesses, and other consultants), by whomsoever brought or alleged, for infringement of patent rights, copyrights, or other intellectual property rights, except with respect to designs, processes or products of a particular manufacturer expressly required by Owner in writing. If Contractor has reason to believe the use of a required design, process or product is an infringement of a patent, Contractor shall be responsible for such loss unless such information is promptly given to Owner.

ARTICLE 10. INSURANCE AND BOND REQUIREMENTS

10.1. CONTRACTOR'S INSURANCE. Prior to the commencement of Work, Contractor shall obtain and maintain, at its expense, from a company or companies acceptable to Owner and authorized to do business in the state in which the Project is located, insurance policies containing the types of coverage and minimum limits of liability set forth on **SCHEDULE C** attached hereto. Such insurance shall be written on a true occurrence basis and shall be maintained without interruption from the date of commencement of the Work until the date of Final Completion.

10.2. CERTIFICATES OF INSURANCE. Prior to commencement of the Work, Contractor shall submit to Owner certificates or other evidence acceptable to Owner of the required insurance policies in accordance with **SCHEDULE C** attached hereto. .

10.3. OWNER'S INSURANCE. Owner shall obtain and maintain, at its expense, the following insurance coverages, provided that the requirement for such coverages shall not prejudice in any way Owner's claims for total indemnity from any and all loses pursuant to any indemnity provided in this Contract.

10.3.1. Owners protective liability insurance, with Owner as the named insured, at limits no less than: $1 million – each occurrence; and $1 million – general aggregate for each project or location.

10.3.2. "All perils" builder's risk insurance, including coverage for the earthquake, flood, and transit perils, at limits sufficient to reflect the full completed value of the Work, including scaffolding, forms, and any off-site storage property. Such insurance shall be written to protect Owner, and all contractors, subcontractors, and sub-subcontractors, as their respective interests may appear.

10.4. BONDS. Any bonds or other security for the performance of the Work shall be provided as may be required elsewhere in the Contract Documents.

ARTICLE 11. TERMINATION

11.1. TERMINATION FOR CAUSE BY OWNER.

11.1.1. The following material breaches of this Contract by Contractor shall be deemed a "Default by Contractor" and cause for termination:

(a) refusing, failing or being unable to properly manage or perform the Work or adhere to the Schedule of the Work;
(b) refusing, failing or being unable to supply the Project with sufficient numbers of properly skilled workers or proper materials;
(c) refusing, failing or being unable to make prompt payment to Subcontractors;
(d) disregarding laws, ordinances, rules, regulations or orders of any public authority or quasi-public authority having jurisdiction over the Project;
(e) refusing, failing or being unable to substantially perform in accordance with the terms of the Contract as determined by Owner, or as otherwise defined elsewhere herein; or
(f) refusing, failing or being unable to substantially perform in accordance with the terms of any other construction contract between Owner and Contractor.

11.1.2. Upon a Default by Contractor, Owner may give written notice to Contractor setting forth the nature of the default and requesting cure within seven (7) calendar days from the date of notice. At any time thereafter, if Contractor fails to initiate the cure or fails to expeditiously continue such cure until complete, the Contract will immediately terminate, and Owner, without prejudice to any other rights or remedies, may take any or all of the following actions:

(a) complete all or any part of the Work, including supplying workers, material and equipment which Owner deems expedient to complete the Work;

(b) contract with others to complete all or any part of the Work, including supplying

workers, material and equipment which Owner deems expedient to complete the Work;

(c) withhold payment due Contractor;

(d) take such other action as is necessary to correct such failure;

(e) take possession of all materials and equipment to be incorporated in the Work;

(f) directly pay Contractor's Subcontractors compensation due to them from Contractor and withhold such payment from any payments owed to Contractor;

(g) finish the Work by whatever method Owner may deem expedient; and

(h) require Contractor to assign Contractor's right, title and interest in any or all of Contractor's subcontracts or orders to Owner.

11.1.3. If Owner terminates the Contract for cause, Contractor shall not be entitled to receive further payment, and shall be subject to Owner's right to recover from Contractor Owner's damages resulting from the termination.

11.1.4. If Owner terminates this Contract for cause, and it is subsequently determined by a court of competent jurisdiction that such termination was without cause, then in such event, said termination shall be deemed a termination for convenience as set forth below.

11.1.5. Termination for cause is in addition to any other rights and remedies available to Owner provided in the Contract Documents or by law. If Owner's cost arising out of Contractor's failure to cure, including the cost of completing the Work plus other damages and reasonable attorneys' fees, exceeds the unpaid Contract Price, Contractor shall be liable to Owner for such excess costs. If Owner's costs are less than the unpaid Contract Price, Owner shall pay the difference to Contractor.

11.2. TERMINATION FOR CAUSE BY CONTRACTOR.

11.2.1. The following material breaches of this Contract by Owner shall be deemed a "Default by Owner" and cause for termination:

(a) refusing, failing or being unable to make prompt payment to Contractor under an approved Application for Payment within the time stated in the Contract Documents;

(b) disregarding laws, ordinances, rules, regulations or orders of any public authority or quasi-public authority having jurisdiction over any Project; or refusing, failing or being unable to substantially perform in accordance with the terms of this Contract or any other Contract between Owner and Contractor.

11.2.2. Upon a Default by Owner, Contractor may give written notice to Owner setting forth the nature of the default and requesting cure within seven (7) calendar days from the date of notice. If Owner fails to cure the default within seven calendar days, Contractor, without

prejudice to any rights or remedies, may give written notice to Owner of immediate termination.

11.3. TERMINATION OR SUSPENSION FOR CONVENIENCE. Owner may at any time give written notice to Contractor terminating this Contract or suspending the Project, in whole or in part, for Owner's convenience and without cause. If Owner suspends the Project for convenience, Contractor shall immediately reduce its staff, services and outstanding commitments in order to minimize the cost of suspension.

11.4. COMPENSATION WHEN CONTRACTOR TERMINATES FOR CAUSE OR OWNER TERMINATES FOR CONVENIENCE. If this Contract is (i) terminated by Contractor pursuant to this Article; (ii) terminated by Owner pursuant to Article 11.3; or (iii) suspended more than three months by Owner pursuant to Article 11.3, Owner shall pay Contractor specified amounts due for Work actually performed prior to the effective termination date and reasonable costs associated with termination.

11.5. COMPENSATION WHEN OWNER TERMINATES FOR CAUSE. If this Contract is terminated by Owner for cause pursuant to this Article, no further payment shall be made to Contractor until Final Completion of the Project. At such time, Contractor shall be paid the remainder of the Contract Price less all costs and damages incurred by Owner as a result of the default of Contractor, including liquidated damages applicable thereto. Contractor shall additionally reimburse Owner for any additional costs or expenses incurred.

11.6. LIMITATION ON TERMINATION COMPENSATION. Regardless of the reason for termination or the party terminating, the total sum paid to Contractor shall not exceed the Contract Price, as properly adjusted, reduced by the amount of payments previously made and penalties or deductions incurred pursuant to any other provision of this Contract, and shall in no event include duplication of payment.

11.7. CONTRACTOR'S RESPONSIBILITY UPON TERMINATION. Regardless of the reason for termination or the party terminating, if this Contract is terminated, Contractor shall, unless notified otherwise by Owner, (a) immediately stop work; (b) terminate outstanding orders and subcontracts; (c) settle the liabilities and claims arising out of the termination of subcontracts and orders; and (d) transfer title and deliver to Owner such completed or partially completed Work, and, if paid for by Owner, materials, equipment, parts, fixtures, information and such contract rights as Contractor has.

ARTICLE 12. RESOLUTION OF CLAIMS AND DISPUTES

12.1. FACILITATIVE MEDIATION. In case of any dispute, claim, question or disagreement arising out of this Contract or the breach thereof, the parties shall first attempt resolution through mutual discussion. If the parties cannot resolve the matter through mutual discussion, as a condition precedent to any litigation, the parties shall in good faith participate in private, non-binding facilitative mediation seeking a just and equitable resolution satisfactory to all parties. No party to this Contract shall be required to participate in any binding arbitration proceedings.

12.2. COURT ACTIONS AND JURY WAIVER. Except as prohibited by law, venue for all legal actions arising hereunder shall reside only in the state or federal courts sitting in Mecklenburg County, North Carolina. The parties agree that such courts shall have personal and subject matter

jurisdiction over matters arising hereunder, and waive any right to object to venue. THE PARTIES AGREE TO WAIVE AND DO HEREBY WAIVE ANY RIGHTS EITHER MAY HAVE TO TRIAL BY JURY OF ANY SUCH DISPUTE.

12.3. PERFORMANCE DURING DISPUTE RESOLUTION. Owner and Contractor agree that pending the resolution of any dispute, Owner and Contractor shall each continue to perform their respective obligations without interruption or delay, and Contractor shall not stop or delay the performance of the Work.

ARTICLE 13. DRAWINGS, SPECIFICATIONS AND OTHER INSTRUMENTS OF SERVICE

13.1. The Drawings, Specifications and other documents, including those in electronic form, are instruments of service through which the Work to be executed by Contractor is described. Neither Contractor nor any Subcontractor shall own or claim a copyright in any such documents, and all copies, except Contractor's record set, shall be returned or suitably accounted for to Owner on request upon completion of the Work. Such documents are for use solely with respect to this Project. They are not to be used by Contractor or any Subcontractor on other projects or for additions to this Project outside the scope of the Work without specific written consent of Owner. Contractor, its Subcontractors and their sub-subcontractors are authorized to use and reproduce applicable portions of such documents as appropriate for the execution of their Work.

13.2. The Drawings and Specifications are complementary. If Work is shown on one but not on the other, Contractor shall perform the Work as though fully described on both consistent with the Contract Documents and reasonably inferable from them.

13.3. In case of conflicts between the Drawings and Specifications, the Specifications shall govern. In any case of omissions or errors in figures, drawings or specifications, Contractor shall immediately submit the matter in writing to Owner for clarification. Owner's clarifications are final and binding on all parties. Where figures are given, they shall prevail over scale dimensions

13.4. Any terms that have well-known technical or trade meanings, unless otherwise specifically defined in this Contract, shall be interpreted in accordance with their well-known meanings.

ARTICLE 14. GENERAL TERMS AND CONDITIONS

14.1. ASSIGNMENT. Contractor shall not assign its interest in this Contract without the written consent of Owner, which may be withheld in its sole discretion. Owner may assign the Contract to an affiliate of Owner, to another contractor performing work at the site, to a lender providing financing for the Project, or to any purchaser of the Project. An assigning party shall nevertheless remain legally responsible for all obligations under this Contract, unless otherwise agreed by the other party. Upon the request of Owner, Contractor shall execute documents required by Owner's lender whereby Contractor agrees that in the event of Owner's default under any construction loan, Contractor will complete the services required by this Contract so long as the lender fulfills the obligations of Owner toward Contractor as set forth in this Contract.

14.2. CONFIDENTIALITY. Contractor shall treat as confidential and not disclose to third persons, except its Subcontractors and their sub-subcontractors as is necessary for the performance of the Work, or use for its own benefit, any of Owner's Drawings, Specifications, confidential information, know-how, discoveries, production methods and the like that may be disclosed to

Contractor or which Contractor may acquire in connection with the Work. Contractor shall ensure that its Subcontractors and their sub-subcontractors abide by these confidentiality terms.

14.3. REPRESENTATION. Execution of this Contract by Contractor constitutes a representation that it has visited the Worksite, become generally familiar with the local conditions under which the Work is to be performed, and correlated its personal observations with requirements of the Contract Documents. Contractor further represents that it has the skill, knowledge and experience required for the Project, and that it and its Subcontractors have all licenses, registrations and authority required by the State where the Project is located necessary to perform the Work and (as may be necessary) to collect Sales Taxes

14.4. GOVERNING LAW. This Contract shall be deemed to be entered into and governed by the law of the State of North Carolina.

14.5. INTEGRATION. This Contract represents the entire and integrated Contract between Owner and Contractor, and supersedes all prior negotiations, representations or Contracts, either written or oral, for the Project. This Contract may be amended only by written instruments signed by both Owner and Contractor, and is subject to such reasonable modifications as may be required by Owner's lender(s) or insurer(s), if any.

14.6. NOTICES. Unless otherwise provided, all notices given pursuant to this Contract shall be in writing and shall be delivered (i) in hand or electronically to the other party's designated Representative, (ii) by registered or certified mail, return receipt requested, or (iii) by a reputable overnight carrier that provides evidence of delivery. If a response to a notice is required within a certain period, then for such purpose the notice shall be deemed given to the receiving party on the business day of personal or electronic delivery, or on the third business day after posting by the Postal Service, or on the first business day after acceptance by the overnight carrier (as the case may be). Notices shall be addressed to the other party (or its Representative) as provided on the last page hereof (or as modified by notice). Upon request, the parties shall acknowledge in writing their receipt of a notice.

14.7. SEVERABILITY. If any provision of this Contract, or the application thereof, is determined to be invalid or unenforceable, the remainder of that provision and all other provisions shall remain valid and enforceable.

14.8. WAIVER. No provision of this Contract may be waived, and no failure of Owner to insist on strict adherence to this Contract shall be deemed a waiver or release of Contractor's obligations, except by written agreement of the parties. A waiver of a provision on one occasion shall not be deemed a waiver of that provision on any subsequent occasion, unless specifically stated in writing. A waiver of any provision shall not affect or alter the remaining provisions of this Contract.

14.9. SURVIVAL. All provisions of this Contract that contain continuing obligations shall survive its expiration or termination.

14.10. THIRD-PARTY BENEFICIARIES. This Contract shall inure solely to the benefit of the parties hereto and their successors and assigns. Except as otherwise specifically provided in this Contract, nothing contained in the Contract Documents shall create a contractual relationship with between Owner and a Subcontractor, or create any rights or cause of action in favor of any

third party against either Owner or Contractor.

14.11. SUCCESSORS AND ASSIGNS. The terms and conditions of this Contract shall be binding upon both parties hereto, their successors and permitted assigns.

14.12. EFFECT. This Contract is executed under seal, effective on the Effective Date first indicated above or, if not so indicated above, the date upon which the last party signs this Contract.

EXECUTION PAGE TO FOLLOW

IN WITNESS WHEREOF, Owner and Contractor have caused this Construction Contract to be duly executed as of the Effective Date.

OWNER:
FOOD LION, LLC

_____
Witness

By: _____

Print Name: _____

Print Title: _____

Owner's Representative:
Name: Scott Shue
Title: Director of Store Development
Office: 704-310-4415

Owner's Address:
Food Lion, LLC
c/o Ahold Delhaize USA Services, LLC.
Attn: Store Development
2110 Executive Drive
P.O. Box 1330
Salisbury, NC 28145-1330

CONTRACTOR: _____

_____
Witness

By: _____

Print Name: _____

Print Title: _____

Contractor's Representative:

Name:_____

Title: _____

Office: _____

Mobile: _____

Fax: _____

E-mail: _____

Contractor's Address:

_____

_____

Contractor's License #: _____

PIN #: N/A
Contract #: FL Store #
Project:

SCHEDULE A

LIST OF CONTRACT DOCUMENTS

The Contract Documents are listed below. The Contract Documents are intended to be interpreted in harmony so as to avoid conflict. In the event of conflict, the Contract Documents shall take precedence in the order in which they are numbered below, with the higher numbered document having precedence, unless a provision in a Contract Document explicitly states that it takes precedence over another document.

1. This Construction Contract, including the Schedules referenced herein and attached hereto.

2. Supplemental General Conditions: **Food Lion Bid Walk Through Notes: Store #_____ dated _____.**

3. Scope of Work: Based on Bid Drawings and Walk Notes.

4. Drawings and Specifications: Based on Bid Set of Construction Documents.

5. All written modifications and Change Orders hereafter agreed to in accordance with the provisions of this Construction Contract.

SCHEDULE B

ACKNOWLEDGEMENT OF PAYMENT AND RELEASE OF LIEN

For and in consideration of _____ (U.S. $ _____), the undersigned "Contractor", for itself and its successors and assigns, hereby releases and forever discharges _____, and its affiliates, their directors, officers, employees and agents, and the heirs, successors and assigns of all of the foregoing (collectively, the "Company") from any and all claims, demands, actions and obligations respecting payment for any and all work, labor, services, materials and/or equipment (collectively "Work") furnished, *through the date specified below*, to the construction project located at _____, _____, _____ (the "Premises") pursuant to a certain construction or vendor agreement between the Company and Contractor dated _____, 20___, (as amended the "Contract").

Contractor acknowledges receipt of such payment as *[select one]*:

____ Progress Payment as due under the Contract for Work through _____, 20___ _____
[check, date, and initial if progress payment] *Initials*

____ Final Payment in full under the Contract, and for all Work through the date hereof. _____
[check and initial if final payment] *Initials*

In consideration for such payment, Contractor covenants and agrees that it shall not claim or file any lien against the Premises for any Work furnished to the Premises *through the date specified herein*; and hereby irrevocably releases and waives each and every lien, charge or claim of any nature whatsoever which it has or may have respecting payment for any such Work *through the date specified herein*.

Contractor further represents and covenants that all subcontractors, suppliers, mechanics and laborers hired or engaged by Contractor have been paid in full, or shall be paid immediately from the proceeds of this payment, for all Work furnished to the Premises *through the date specified herein*. Contractor hereby agrees to indemnify, defend and hold the Company harmless from any and all loss, damage, cost or expense of whatever nature, including reasonable attorneys' fees, arising out of any claims for payment made, or liens filed, by Contractor or any subcontractor, sub-subcontractor, laborer, person, supplier or other party claiming through or under Contractor for any Work furnished *through the date specified herein*.

IN WITNESS WHEREOF, Contractor has caused this instrument to be duly executed _____ , 20___.

CONTRACTOR: _____
(Full Name of Contractor)

By: _____
Title: _____
Address: _____
_____

STATE OF _____
COUNTY OF _____

Sworn to before me this ____ day of _____, 20___.

_____
Notary Public
Print Name: _____
My Commission Expires: _____

SCHEDULE C

INSURANCE REQUIREMENTS FOR CONTRACTORS

1. CONTRACTOR'S REQUIRED INSURANCE. Prior to commencement of the Work, Contractor shall obtain, at its expense and in accordance with the requirements set forth below, the following types and minimum limits of insurance coverage for claims3 that may arise out of the performance or non-performance of services under the Contract by Contractor and its Subcontractors, and by anyone directly or indirectly employed by them and anyone for whose acts they may be liable:

1.1 **Commercial General Liability**, which names Owner and its affiliates as additional insureds, and includes (i) coverage for premises/operations, product/completed operations, contractual liability, independent contractors, broad-form property damage, underground, explosion and collapse hazard, and personal/advertising injury; and (ii); per-occurrence limits of not less than:

a. **Bodily Injury and Property Damag**e: $1,000,000 Each Occurrence; and $2,000,000 Aggregate each project or location;
b. **Products and Completed Operations**: $1,000,000 Aggregate; and
c. **Personal Injury and Advertising Injury:** $1,000,000.

1.2 **Commercial Comprehensive Automobile Liability** or **Business Auto Liability**, which names Owner and its affiliates as additional insureds, and includes contractual liability coverage and coverage for all owned, hired and non-owned vehicles, with minimum coverage of $1,000,000 Each Occurrence; Single Limit Bodily Injury and Property Damage Combined; and with "Symbol 1" (any auto) coverage.

1.3 **Umbrella Liability Insurance**, which names Owner and its affiliates as additional insureds; and has minimum coverage of:

a. $5,000,000 Each Occurrence;
b. $5,000,000 General Aggregate, each project or location; and
c. $5,000,000 Aggregate, products and completed operations.

1.4 **Workers' Compensation** and **Employer's Liability.** Workers' Compensation or similar state or federal employee coverage, at such limits as are required by the state in which the Project is located; and Employer's Liability or equivalent Stop Gap Coverage, which names Owner and its affiliates as additional insureds, and has minimum coverage of $1,000,000, including for Occupational Disease.

2. TOOLS AND EQUIPMENT INSURANCE. Contractor shall carry insurance in such amounts as Contractor deems necessary for protection against loss of owned or rented equipment, facilities and tools, including any tools, equipment scaffolds, bracings, stagings, towers, forms and similar items owned or rented by its Subcontractors. Owner shall have no liability with respect to such equipment, facilities and tools; and such insurance shall waive all rights of subrogation in favor of Owner. Failure of Contractor to secure such insurance or to maintain adequate levels of coverage shall not obligate Owner, its agents or employees for any losses of owned or rented equipment.

3. POLICY REQUIREMENTS.

3.1 Insurance carriers are subject to Owner's reasonable approval. Carriers must be admitted in the State in which the Work is to be performed and have a *Best's* rating of at least A-.

3.2 Owner and its affiliates must be named as Additional Insureds by endorsement to all policies, except the worker's compensation policy. Upon Owner's request, any landlord or other party with an interest in the Worksite must also be named an Additional Insured.

3.3 All required insurance policies must afford to Owner, at its address contained in the Contract, at least thirty (30) days written notice prior to non-renewal, cancellation, or material reduction in the coverage provided.

3.4 Notwithstanding the minimum coverage limits in Section 1 above, all required policies must be written for not less than the limits of liability specified in the Contract Documents or required by law, whichever coverage is greater.

3.5 Deductibles shall not exceed $25,000, except as approved in writing by Owner.

3.6 All required insurance must be written on a true Occurrence Basis, and must be maintained without interruption from the date of commencement of the Work until final payment.

4. CERTIFICATES OF INSURANCE.

4.1 Certificates of Insurance evidencing the required coverages must be provided to Owner prior to commencement of the Work. Renewal certificates must be provided before expiration of current insurance policies.

4.2 Certificate of Insurance forms must be acceptable to Owner.

4.3 Certificates of Insurance must identify Owner and its affiliates as *Additional Insureds* under the coverages provided (to the extent required above) as follows:

Food Lion, LLC and its affiliates and all of their members, directors, officers and employees.

4.4 Certificates must state that the policy coverages will not be canceled or allowed to expire until at least 30 days after written notice to the Owner.

5. NOTICE REQUIREMENTS.

5.1 Contractor shall notify Owner of any reduction of coverage on account of revised limits or claims paid under the General Aggregate or both, with reasonable promptness based on Contractor's information and belief.

5.2 Within 24 hours of its occurrence, Contractor shall notify Owner in writing of any loss or damage at the Worksite or of any claim arising at the Worksite or of any incident that might give rise to a claim. Contractor shall have no right to negotiate or approve settlement of any loss or claim for which Owner has or may have an insurable interest or legal liability, without Owner's prior written approval.

SECTION 01 00 00 - GENERAL REQUIREMENTS

PART 1.0 – GENERAL

1.1 DOCUMENTS & RECORDS:

A. Maintain at the job site a copy of all drawings, specifications, addenda, approved shop drawings, change orders, field orders, other contract modifications, and other approved documents submitted by the Contractor in compliance with various sections of the Specifications.

B. Each of these Project Record Documents shall be clearly marked, "Project Record Copy"; maintained in good condition; available at all times for inspection by the Owner, and not used for construction.

C. These records shall be transmitted to the Owner at the completion of the Project.

D. Mark the most appropriate document to show:

1. Significant changes made during the construction process.
2. Significant detail not shown in the original Contract Documents.

E. The information given shall include, but not be limited to:

1. The location of underground utilities and appurtenances, referenced to permanent surface improvements;
2. The location of internal utilities and appurtenances concealed in building structures, referenced to visible and accessible features of the structures;
3. The corrected dimensions when changed from those shown on the Drawings.

F. Submit a progress schedule of suitable type - extended bar chart, Gantt chart, critical path method, etc., on a bi-monthly basis.

G. Progress schedule shall show concisely the manner in which each trade and the different phases of work are started, progressed and related to or dependent upon other trades and phases.

H. Submit for approval of Owner and upon approval, be responsible for maintaining such schedule by adhering to and determining coordination required to realize its goal.

I. The ordering of Food Lion equipment (walk-ins, cases, compressors, fixtures, etc.) will not be scheduled unless a completed copy of the "Construction Commencement Report" has been received by the Food Lion Construction Department. The delivery of Food Lion equipment will not start until all sitework including paving is completed.

J. Food Lion will not be responsible for extra work authorized by any Food Lion representative where the work is already included in the plans or specifications.

K. Occupancy permit is required two weeks prior to store opening.

L. Any Food Lion comment or revision must be incorporated into construction documents prior to start of construction. Food Lion shall not be responsible for any additional cost resulting from project beginning prior to receiving approved construction drawings.

CONSTRUCTION COMMENCEMENT REPORT

Store #: _____
Location: _____
Street Address: _____
County: _____

TO: FOOD LION

P.O. Box 1330
Salisbury, NC 28144
ATTN: CONSTRUCTION DEPT.

THE FOOTINGS FOR THE ABOVE STORE WERE POURED FROM:

GENERAL CONTRACTOR: _____ DATE: _____
PROJECT MANAGER: _____ SITE PHONE: _____
ADDRESS: _____ OFFICE PHONE: _____

ARCHITECT: _____ PHONE: _____
ADDRESS: _____ CONTACT PERSON: _____

ACTUAL STREET ADDRESS OF STORE: _____
(INCLUDING STREET NAME & NUMBER): _____
BUILDING NUMBER OR SUITE NUMBER: _____

A. *NOTE: Submit a site plan to the local postmaster for assignment.
A response may take as long as four weeks.

SUB CONTRACTORS:

ELECTRICAL: _____ HVAC: _____
ADDRESS: _____ ADDRESS: _____
CONTACT: _____ CONTACT: _____
PHONE: _____ PHONE: _____

PAVING/CURBING: _____ SITE UTILITIES: _____
ADDRESS: _____ ADDRESS: _____
CONTACT: _____ CONTACT: _____
PHONE: _____ PHONE: _____

MASONRY: _____ GLASS/GLAZING: _____
ADDRESS: _____ ADDRESS: _____
CONTACT: _____ CONTACT: _____
PHONE: _____ PHONE: _____

AUTOMATIC DOORS: _____ ROOFING: _____

ADDRESS: _____ ADDRESS: _____
CONTACT: _____ CONTACT: _____
PHONE: _____ PHONE: _____

VC TILE: _____ QUARRY TILE: _____
ADDRESS: _____ ADDRESS: _____
CONTACT: _____ CONTACT: _____
PHONE: _____ PHONE: _____

PAINTING: _____ PLUMBING: _____
ADDRESS: _____ ADDRESS: _____
CONTACT: _____ CONTACT: _____
PHONE: _____ PHONE: _____

SPRINKLERS: _____ REFRIGERATION: _____
ADDRESS: _____ ADDRESS: _____
CONTACT: _____ CONTACT: _____
PHONE: _____ PHONE: _____

UTILITY COMPANIES THAT WILL PROVIDE PERMANENT SERVICE TO THIS STORE:

ELECTRICAL: _____ GAS: _____
ADDRESS: _____ CONTACT: _____
PHONE: _____ PHONE: _____
ACCOUNT #: _____

TELEPHONE: _____ WATER: _____
ADDRESS: _____ ADDRESS: _____
CONTACT: _____ CONTACT: _____
PHONE: _____ PHONE: _____

CO. HEALTH DEPT.: _____
ADDRESS: _____
CONTACT: _____
PHONE: _____

Utility Site Visit Information

Important: Electrical engineer to complete the following form and coordinate with drawings. It is important that the following information is collected during the initial site visit with the Utility Company. The following form once completed shall be incorporated into the drawing coversheet as well as a copy sent to Food Lion Engineering Department (New Stores) or Engineering Department (Takeover Stores/Remodels).

DATE:
LOCATION (CITY, STATE):
ADDRESS/INTERSECTION:
BANNER:

Transformer Information: ☐ Pad-Mounted ☐ Pole-Mounted ☐ Vault

☐ Size in kVA:

☐ Impedance: %
☐ Fault current available at secondary of transformer:
☐ Location of transformer shown on site plan
☐ Using the (select one): ☐ existing transformer or ☐ new transformer
☐ Transformer pad detail and requirements from utility
☐ Only feeding store or are other customers being fed from transformer:
☐ Identify utilities scope of work for transformer, lug requirements and who provides, who terminates secondary conductors in transformer:

Utility Information:

Important: If power provider differs from the equipment provider, include the equipment providers contact info below.

☐ Name:
☐ Contact person/info:
☐ Special metering requirements (how does utility meter the customer):
☐ Switchgear AIC rating required
☐ Other requirements – transformer vaults, metal conduit, etc.

Facility Information:

☐ Specific location shown for NexGear Cabinet(s)
☐ Verify enough room to install NG Cabinet(s)
☐ Site Plan
☐ One line – Multiple mains identified (if applicable)

PART 2.0 GENERAL

A. The job site will be required to have at all times an answering machine or a portable touch-tone telephone carried by the job superintendent and a fax machine in the job trailer.

B. The Contractor shall secure and pay for all permits, fees, and approvals required by the City, County, State and other government agencies related to the construction and occupancy of the specified structure including, but not limited to, general plumbing, heating, electrical, demolition and site work.

C. The Contractor shall also secure permits and/or approvals from the Health Department and/or agency with jurisdiction.

D. Changes to the project as proposed by such government official must be approved by Food Lion, in writing, prior to implementation.

E. The Contractor shall verify that the plans and specifications meet the approval of such agencies with jurisdiction over the project.

F. Food Lion will not be liable for costs related to modifications and changes to the structure necessary to obtain any permits or approvals.

G. Food Lion fixturing schedule will be implemented upon Food Lion acceptance of the building as “substantially complete”. Notification of substantial completion must be made to Food Lion 8 ½ weeks prior to opening in order to provide needed lead time for the fixturing process.

H. All Trades (general, electrical, plumbing, mechanical and refrigeration) will have crews on site, full time, 3 days prior to the opening date and on opening day.

I. The General Contractor shall supply two carpenters and two laborers at his expense, for a total of 160 man-hours, to be on call during the 8 ½ week fixturing process.

J. Professional fees such as architectural and engineering, pertaining to revisions initiated by Food Lion, will be borne by Owner.

K. The building occupancy permit will be secured by the General Contractor a minimum of 2 weeks prior to opening.

L. The General Contractor will have the responsibility of furnishing plans to, but not limited to, the Health Department, Building Inspection Department, Fire Marshall, and/or any governmental agency with jurisdiction.

M. The General Contractor and/or Owner will be required to perform a one year warranty walk-through with a Food Lion representative to correct defects in construction evident at that time.

N. Food Lion reserves the right to provide replacement contractors to complete any work to meet the demands of the schedule.

O. The General Contractor will be responsible for maintaining a hazardous notification bulletin in compliance with all OSHA requirements at the jobsite at all times.

PART 3.0 REMODEL CONDITIONS

3.1 GENERAL CONTRACTOR (REMODEL):

A. General Contractor: Must include on the Bid Tab Sheet the names of the following subcontractor trades that will be used: HVAC, Plumbing, Electrical, and Vinyl Floor Tile. The General Contractor must use the subcontractors listed on the bid tab sheets for this project, unless the subcontractor states in writing after the bid that they are unable to perform.

B. It is the policy of Food Lion to encourage all General Contractors to utilize minority subcontractors. This shall involve the inclusion of qualified minority subcontractors as participants in the bidding process whenever possible. However, the award of such subcontractors shall be based solely on the best price for providing the highest quality goods and services.

C. General Contractor: Must include the disposal of all shelving in the sales area (if applicable). Food Lion employees will palletize the shelving, and the General Contractor shall load the shelving onto a truck supplied by the General Contractor. Also, the General Contractor shall remove and dispose of all check stands in the sales area (if applicable).

D. The price shall be based on a square foot price to level, patch, and grind smooth (using an industrial grinder/sander) all high spots, and to fill in low spots that could show up as defects in the new tile. This will be done prior to installation of any new tile. The floor tile contractor shall use a type of patching or leveling compound specified by Food Lion All change orders for extra work, or a reduction in the scope of floor patching and concrete leveling will be based upon a 40lb. bag price.

E. The General Contractor shall provide all labor and material necessary to cover the sales area gondolas, and food cases with polyethylene plastic in the immediate vicinity of any demolition (ie: VCT, concrete, ceiling tile and grid demo) to protect product from dust.

F. The General Contractor will include in his bid price a job site trailer, a fax machine, and an answering machine for the superintendent.

G. The General Contractor in the sales area will repair or replace, as needed, any existing stainless steel wraps on the columns.

H. Any newly exposed columns in the sales area as a result of the grocery reset that do not have stainless steel wrapped at the base of the column shall be wrapped with stainless steel four feet above the finished floor.

I. The General Contractor will be required to have full-time supervision at all times when subcontractors are working in the store.

J. All studs shall either be 2x4 wood, or metal stud construction, and shall be plywood covered by 6 mil plastic as a barrier wall between construction areas and the sales floor. These dust walls shall extend up to the roof deck. In all other areas, a 6 mil plastic curtain wall from the floor to roof deck will be used to shield and contain all demolition.

K. The General Contractor will maintain building security at all times, and do whatever is necessary to maintain the integrity of the store at all times.

L. The General Contractor shall maintain a clean and professional job site at all times, and will do whatever is required to clean up construction debris on a daily basis, or as directed by the Food Lion Construction Manager. All job site material will be stored in a neat and orderly manner around the perimeter of the construction zone and should not be stored in any way in the store front parking lot area, unless directly approved by the Food Lion Construction Manager.

M. The General Contractor shall maintain the integrity of the existing ceiling grid and ceiling grid tile system in the sales area as much as possible during construction.

N. All trenching for underground utilities, either inside the sales area or in the rear receiving/staging area, shall be exposed no longer than three days maximum. Inspections must be obtained and concrete poured back over open trenches within three days. There will be no exceptions to this, unless specifically approved by the Food Lion Construction Manager. All open trenches and pits shall be covered with steel plates and carpeting to provide for a smooth transition for traffic flow and customer traffic. The General Contractor shall provide low pile industrial carpeting to cover these steel plates.

O. All construction work in the sales area shall be done at night, and there will be no exceptions without specific approval from the Food Lion Construction Manager. Coordinate time with Food Lion Construction Manager for all 24 hour stores.

P. All Contractors shall use orange reinforced safety fencing in all construction areas at all times to protect Food Lion customers and store personnel from the construction areas. In front of the store, all demolition areas must be barricaded with a plywood wall to protect the shopping center customers during demolition.

Q. The General Contractor will remove all fencing, caging, lights, sprinklers, and then re-install these items following relocation

R. On drawing A1.03, the wall that separates the sales area from the receiving/staging area and prep rooms shall be sealed to the roof deck above the ceiling grid. Field Verify.

S. The General Contractor will include in his bid doweling or keying of all concrete joints where either trenching or new concrete has been poured up to existing concrete. Dowels will be a minimum of 18” on center.

T. Abandoned pits to be filled with #57 stone, then, doweled in 4” concrete on vapor barrier. Seal other end of PVC sleeve with rodent proof material.

U. Seal any holes in masonry or drywall walls with rodent proof material.

V. **PRODUCE PREP ROOM/PRODUCE COOLER/ENTIRE RECEIVING/STAGING AREA CONCRETE:** The General Contractor shall reseal the concrete floor with a penetrating concrete sealer, as specified.. The General Contractor prior to applying new sealer will strip the floors of wax.

W. An Asbestos report will be forwarded to the Bidders prior to the bid date.

X. General Contractor will remove and dispose of all existing rooftop equipment (hoods, fans, HVAC units) that will be abandoned. Old curbs will be capped off and made watertight.

Y. The General Contractor shall include providing all necessary compacted fill to bring the demolition area up to the existing Food Lion store grades and elevations.

Z. The General Contractor shall include approximately 12 weeks of night work by the General Contractor and subcontractors during the remodel unless otherwise informed by Food Lion Construction Manager.

AA. No work is allowed in the sales area unless it is specifically approved by the Food Lion Construction Manager.

BB. General Contractor: All new masonry will match heights of existing masonry walls. Field inspect and include in the base bid all work necessary to provide and install all new materials for the new store front canopy where applicable.

CC. The General Contractor is responsible for providing at least one carpenter during the reset operations for the entire week to assist the store for various needs.

DD. The General Contractor shall supply the Electrical Subcontractor bidders with a copy of the refrigeration summary report that has been supplied with the bid documents. Electrical work for the refrigeration upgrade must be included in the base bid.

EE. Seal ends of PVC sleeves in refrigeration pits, fill void around refrigeration lines with rodent proof material, both ends of PVC sleeve.

FF. Solid cap required on all interior masonry walls not sealed to roof deck, use 5/4 board or flashing.

GG. Seal all penetrations into Janitor’s Room with caulk behind escutcheons.

HH. Install flashing around all walk-ins, vertical and horizontal to adjacent walls and walk-ins.

II. See specific sections for additional requirements and information for remodel conditions.

3.2 ELECTRICAL CONTRACTOR (REMODEL):

A. The Electrical Contractor shall include all electrical work shown on the refrigeration summary provided by the General Contractor and bid documents as part of the refrigeration modifications.

B. The Electrical Contractor shall work with the power company to determine whether or not any credit will be given to Food Lion for increased revenue and applied against the cost of relocating the power equipment.

C. Include the relocation of all outside floodlights on the existing outside walls that are going to be demolished and the outside lights need to be relocated to the outside walls of the new expansion exterior walls.

D. The Electrical Contractor will look at the existing telephone system and provide any new conduit inside the building for any relocated telephone wire that has to be run from outside to the inside location of the telephone backboard.

E. The Electrical Contractor will include in his bid either relocating or removing existing sales area lighting to allow the Mechanical Contractor to install his ductwork, and the General Contractor will include maintaining the existing ceiling grid system or patching and re-install after the Mechanical Contractor has completed his work.

F. The Electrical Contractor shall relocate any existing communications equipment and speaker system during demolition, and maintain these systems to allow store personnel to use them during the entire renovation project.

G. The Electrical Contractor shall maintain all security systems and cameras in the store and shall temporarily suspend them per the direction of the Food Lion Construction Manager as needed.

H. The Electrical Contractor shall relocate any surface mounted conduit and electrical circuits in the sales area to behind the existing/new walls.

I. The Site Lighting Contractor shall investigate the existing parking lot lighting system, and provide a photometric lighting analysis for the storefront parking area, and make professional recommendations for improving the front site lighting, and bringing them up to current specification criteria. The recommendations will provide at least three options for the parking lot lighting improvements. Any modification by Food Lion shall be the responsibility of Food Lion by change order.

J. The Electrical Contractor is responsible for installing the burglar/security system as shown on the drawings.

3.8 HVAC CONTRACTOR (REMODEL):

A. The HVAC Contractor shall provide temporary heat or air conditioning to the sales area and rear grocery area at all times, even if there is a requirement to perform work and upgrade the existing air handler to the new store specifications. There

will be a maximum down time of two days, and the HVAC Contractor will man the job appropriately, even if its 24 hours a day, to provide the change out of the new air handler system. It will be the General Contractors responsibility to effectively coordinate any down time in the climate control system in the store.

B. The HVAC Contractor shall obtain (from the ANSEL Hood Pull Station installer) a recessed box and conduit for the pull station in the Deli wall. The HVAC Contractor will provide this box to the General Contractor for installation during the new Deli wall framing.

C. HVAC: Subcontractor will pull/connect all new/relocated/improved control wires for the HVAC as required.

D. HVAC: The entire store HVAC system will be re-balanced following modifications. All existing HVAC components will be evaluated by the HVAC Mechanical Contractor for performance. Any problems will be brought to the attention of Food Lion Existing system repairs will be handled as change orders.

E. HVAC: The Mechanical Contractor will coordinate and schedule any climate control shut-down for air handler/condenser change out with Food Lion Construction Manager. No shut-down will last longer than 48 hours. This may require 24 hour service work by the Mechanical Contractor until all systems are brought back on line.

3.4 PLUMBING CONTRACTOR (REMODEL):

A. The Plumbing Contractor shall check with the local authorities to determine whether or not a grease trap will be required in the Deli/Bakery and Meat Prep Room, and install as required. It will be the Plumbing Contractor’s responsibility to size the grease trap, and obtain any permits and costs involved in installing the grease trap to city code and regulations.

B. The Plumbing Contractor (sheet P-6.01 plumbing schedule) will include in his bid providing and installing all new items on the schedule, including replacing all existing sinks, water heaters, and plumbing fixtures as shown on the plans, and listed on the P-6.01 schedule. Disposal of existing fixtures will also be the plumbing contractor’s responsibility. Check with the Food Lion Construction Manager before ordering any new equipment, or before performing any work.

C. Sales Area Trenching – all gondolas will remain in the sales area during trenching, and installation of new plumbing lines. All dirt from trench excavation will be removed from the store each night; product shall be covered during this process.

3.5 ROOFING CONTRACTOR (REMODEL):

A. The roofing contractor shall supply and install roof system in areas of expansion and patching to match existing roof. If the entire roofing system is to be replaced or is new, coordinate with section 07 50 0 for materials.

B. On the roof include installing walk pads around all existing roof top mechanical condensers and equipment. Also, include installing walk pads around all new equipment and steel that is going to be installed on the expansion side and from the roof hatch to the Deli equipment.

C. All roofing penetration to either the new roof or existing roof shall meet NRCA (National Roofing Contractors Association) standards. This includes tying in the old roof top system to the old roof system, and the tie-in shall meet NRCA guidelines and details for tying-in a new system to an old system. The General Contractor and the Roof Contractor shall build (if required on the structural drawings, or by the roof warranty manufacturer) an expansion joint system between the old roof system and the new roof system.

D. Exterior Demolition: The Roofing Contractor will include in his bid weather proofing the exterior parapet walls and the store front canopy (as required) that are demolished as part of the new construction. The contractor will use EPDM rubber, only, to protect the sales area or any part of the existing store from the exterior weather conditions.

E. The Roofing Contractor will be required to maintain a water tight roofing system for the occupied space next to the expansion wall, and the Roofing Contractor shall include in his bid covering the temporary partition wall completely with an EPDM rubber membrane to make completely water tight the temporary partition, and keep the entire space water tight until the new roof deck is extended into the existing shopping center roof, just above the occupied space.

F. The Roofing Contractor will be responsible for flashing in the existing roof system above the occupied space into the new parapet wall that is being built by the General Contractor. It is the Roofing Contractor’s responsibility to maintain watertight integrity for the occupied space next to our expansion area the entire length of the project.

G. The Roofing Contractor shall include adding new 0.040-inch metal coping, pre-finished to a color to match new storefront EIFS field color. This coping will be installed along the entire storefront. All other coping will match the surrounding center’s colors.

H. The Roofing Contractor will cap off all old equipment curbs with sheet metal, 5/8” plywood, and 1” foam-board insulation. Must be watertight, and metal cap must be galvanized, and painted with an aluminum coating.

I. The Roofing Contractor shall include treated wood blocking for attachment of flashing, gutters, and gravel stops where applicable. Roofing Contractor is responsible for secure attachment of wood blocking to roof structure to maintain integrity of roof edge.

3.6 PAINTING (REMODEL):

A. The Painting Contractor shall include in his price, repainting all existing interior painted surfaces, hollow metal doors, door frames, masonry walls that are already existing and painted to match the used store color specifications.

B. The painting contractor shall paint all existing and new roof top steel, and the existing roof hatch.

C. Following removal of wall coverings (wallpaper, etc.) painting contractor shall remove, prep, and prime surface prior to finish coat being applied.

3.7 DEMOLITION (REMODEL):

A. All jackhammering inside the walls of the Food Lion store will be done only at night. All debris will be removed the same night. The General Contractor will provide an exhaust system in all areas where demolition occurs. Wet mop-heads will be used at all times by the demolition crews when light jackhammering is being done in the store. Electric jackhammers must be used when inside the Food Lion space.

B. The General Contractor will provide necessary lighting at night or early morning to accommodate demolition. Special times for demolition, including partial days for demolition due to adjacent tenant needs, may be required. This work must be coordinated with Food Lion Construction Manager prior to starting demolition.

C. Only wet-cutting, diamond-bladed walk-behind saws may be used when cutting concrete in the Food Lion and expansion spaces. Wet shop vacuum cleaners must be used during saw cutting in the Food Lion space.

D. The General/Demolition Contractor shall cover all surrounding gondolas and displays during demolition/floor cutting, with polyethylene plastic minimum 4 mil., prior to starting demolition work.

E. The General Contractor shall remove and dispose of all old rooftop HVAC units, or equipment on the roof areas to be demolished, and all existing roof area above the existing Food Lion Check with the owner prior to disposal. The owner may want to keep this equipment.

F. No demolition may begin in the sales area without specific approval from the Food Lion Construction Manager.

3.8 SPRINKLER CONTRACTOR (REMODEL):

A. The Sprinkler Contractor must investigate the existing building conditions and local code requirements. The Sprinkler Contractor must include in the bid all work and materials necessary to modify, upgrade, improve, or provide a completely new, and fully functional sprinkler system (if required) to the Food Lion new and existing spaces, including all walk-in cooler boxes and interior rooms.

3.9 VCT CONTRACTOR (REMODEL):

A. Concrete Floor Patch Material – only the following materials can be used:

1. Mapei "Plani/Patch" Floor Patch

B. All VCT work in the sales area must be done at night.

C. VCT Contractor shall include in the base bid purchasing an additional 5% back stock to be left at the store after all punch list work is complete.

D. VCT Contractor must follow the following guidelines during the Food Lion Grocery Reset operation when replacing/laying floor tile:

1. Complete all work under non-food gondolas within 3 hours.
2. Complete all work under food gondolas within 2 hours.
3. Use an 18” – 20” disc sander to grind rough spots in the floor, patch entire store area where floor patch is used.

END OF SECTION 01 00 00

PART 1 - GENERAL

1.1 PROJECT SUMMARY

A. This Section includes the following:

1. Work covered by the Contract Documents.
2. Work phases.
3. Work under other contracts.
4. Use of premises.
5. Owner's/tenant’s occupancy requirements.
6. Specification formats and conventions.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. Project Identification: (Banner / Store #)

1. Project Location:

B. Owner: Food Lion unless noted otherwise.

1. Owner's Representative: Construction Manager

C. The Work included in General Construction includes but is not limited to the following:

1. Construction of a supermarket comprised of all foundations, exterior walls and roofs, and interior construction as indicated on the construction documents, complete, and approved for a Certificate of Occupancy. Work at the project also includes limited interior construction and coordination with a “fixturing contractor” working directly for Food Lion.

D. Work under other contracts:

1. Separate contract: Owner may award a separate contract or use the Owner’s personnel for performance of certain construction operations at the project site. Those operations will be conducted simultaneously with the work under this contract.
2. Cooperate fully with separate contractors so work on the contracts may be carried out smoothly without interfering with or delaying work under this contract.

1.3 PROJECT PHASES

A. This Scope of Work shall include:

1.4 USE OF PREMISES

A. General: Contractor shall have full use of premises for construction operations, including use of Project site, during construction period. Contractor's use of premises is limited only by Owner's/Tenant's right to perform work or to retain other contractors on portions of Project.

B. Use of Site: Limit use of premises to areas within the limits indicated on the Plans. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Owner Occupancy: Allow for Owner occupancy of Project site.
2. Driveways and Entrances: Keep driveways, loading areas and entrances to the grocery store premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.

a. Schedule deliveries to minimize use of driveways and entrances.
b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

1.5 OWNER'S OCCUPANCY REQUIREMENTS

A. Owner Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed areas of building, before Substantial Completion, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and partial occupancy shall not constitute acceptance of the total Work.

1. Architect will (if required) prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied before occupancy.
2. Obtain a Temporary Certificate of Occupancy from authorities having jurisdiction before the Owner occupies the supermarket for “fixturing”.
3. Before partial Owner occupancy of the supermarket, mechanical, plumbing and electrical systems shall be fully operational if included in the contract scope of work, and required tests and inspections shall be successfully completed.
4. On final occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of building.

1.6 SPECIFICATION FORMATS AND CONVENTIONS

A. Specification Format: The Architectural, Structural and MPE Specifications are organized into Divisions and Sections using the 2004 six-digit CSI/CSC format.

1. Division 1: Sections in Division 1 govern the execution of the Work of all Sections in the Specifications.

B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.
2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.

    a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

PART 2 - PRODUCTS

2.1 List of National Accounts and contract information is located on the drawings.

PART 3 - EXECUTION

3.1 These items are national accounts, pre-negotiated, and are the responsibility of the general contractor to manage. Final invoice will be forwarded to Food Lion for payment.

END OF SECTION 01 10 00

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for unit prices.

B. See Section 00 50 00 Form of Agreement for procedures for using unit prices to adjust quantity allowances.

1.2 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.

1.3 PROCEDURES

A. Unit prices include all cost of material, supplies, and equipment delivered to the worksite, less applicable trade discounts, plus requisite taxes; and unless specifically stated otherwise shall also include unloading and handling at the worksite and labor and installation.

B. 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.

END OF SECTION 01 22 00

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for Alternates.

B. List the Proposed values for all Alternates on the Bid Form.

1.2 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 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, with regards to set alternate.

1.3 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.

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.

END OF SECTION 01 23 00

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. Coordination of the Work.
2. Project meetings.
3. Requests for Interpretation (RFIs).

B. See Section 00 50 00 Form of Agreement for a description of the division of Work among separate contracts and responsibility for coordination activities not in this Section.

1.2 DEFINITIONS

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

1.3 COORDINATION

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

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.
4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.

B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work.

1.4 SUBMITTALS

A. Refer to Submittal requirements in section 00 50 00, Form of Agreement.

B. Contractor: Review each submittal and check for coordination with other work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect and/or Owner as noted in Specifications.

C. Approval Stamp: Contractor shall 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.

1.5 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site at time mutually agreed upon, 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 of scheduled meeting dates and times. Attendees to include, General Contractor, General Contractor’s Superintendent, Representatives of Sub-contractors presently active or soon to be active, and Food Lion’s Construction Manager.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees. Items to discuss include but not limited to, project progress, questions, and concerns/problems.
3. Minutes: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner, within three (3) days of the meeting.

B. Preconstruction Conference: Schedule a preconstruction conference before starting construction, at a time convenient to Owner. 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 and their consultants; General Contractor and its superintendent; major subcontractors; suppliers, Food Lion’s Construction Manager, 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: Prepare the meeting agenda. Distribute the agenda to all invited attendees. Items to discuss include but not limited to, project progress, questions, and concerns/problems. Discuss items of significance that could affect progress.
3. Minutes: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner, within three (3) days of the meeting.

C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting as well as General Contractor and Food Lion Construction Manager.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements.
3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.
5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Progress Meetings: Conduct progress meetings at weekly intervals. Coordinate dates of meetings with preparation of payment requests.

1. Attendees: In addition to Food Lion Construction Manager, representatives of Owner, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

    a. Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

        1) Review schedule for next period.

    b. Review present and future needs of each entity present.

3. Minutes: Record the meeting minutes.
4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present within three (3) days of the meeting.

    a. Schedule Updating: Revise Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

1.6 REQUESTS FOR INTERPRETATION (RFIs)

A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI in the form specified.

1. RFIs shall originate with Contractor. RFIs submitted by entities other than Contractor will be returned with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing interpretation and the following:

1. Project name.
2. Date.
3. Name of Contractor.
4. Name of Architect.
5. RFI number, numbered sequentially.
6. Specification Section number and title and related paragraphs, as appropriate.
7. Drawing number and detail references, as appropriate.
8. Field dimensions and conditions, as appropriate.
9. Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
10. Contractor's signature.
11. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.

C. Action: Owner will review each RFI, determine action required, and return it. Allow seven (7) working days for Owner's response for each RFI. RFIs received after 1:00 p.m. will be considered as received the following working day.

1. The following RFIs will be returned without action:

a. Requests for approval of submittals.
b. Requests for approval of substitutions.
c. Requests for coordination information already indicated in the Contract Documents.
d. Requests for adjustments in the Contract Time or the Contract Sum.
e. Requests for interpretation of Architect's actions on submittals.
f. Incomplete RFIs or RFIs with numerous errors.

2. Owner's action may include a request for additional information, in which case Owner's time for response will start again.
3. Owner's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal.

a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Owner in writing within ten (10) days of receipt of the RFI response.

D. On receipt of Owner's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Owner within seven (7) days if Contractor disagrees with response.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log when requested to by the Architect or the Owner. The log will include:

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect.
4. RFI number including RFIs that were dropped and not submitted.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's response was received.
8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
9. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

END OF SECTION 01 31 00

PART 1 - GENERAL

1.1 SUMMARY

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

1. Contractor's Construction Schedule (New Stores).
2. Submittals Schedule.
3. Daily construction reports.
4. Field condition reports.

B. See Section 00 50 00 Form of Agreement for additional information.

1.2 SUBMITTALS

A. Refer to 00 50 00 Form of Agreement

1.3 COORDINATION

A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.

B. Coordinate Food Lion Construction Manager's construction Schedule with the list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from parties involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 SUBMITTALS SCHEDULE

1. Refer to section 00 50 00 Form of Agreement

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established the Notice to Proceed to date of Substantial Completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

B. Activities: Treat each story or separate area as a separate numbered activity for each principal element of the Work. Comply with the following:

1. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
2. Submittal Review Time: Refer to 00 50 00 Form of Agreement. Coordinate submittal review times in Contractor's Construction Schedule with Submittals Schedule.
3. Startup and Testing Time: Include not less than four (4) days for startup and testing.
4. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.

C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

1. Phasing: Arrange list of activities on schedule by phase.
2. Work under More Than One Contract: Include a separate activity for each contract.
3. Work Restrictions: Show the effect of the following items on the schedule:

    a. Partial occupancy before Substantial Completion.
    b. Use of premises restrictions.
    c. Provisions for future construction.
    d. Environmental control.

4. Work Stages: Indicate important stages of construction for each major portion of the Work.

D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion of each separate building, and Final Completion, and the following interim milestones:

1. Completion of all Site Work by the separate Site Contractor.

E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using fragments to demonstrate the effect of the proposed change on the overall project schedule.

2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal Gantt-chart-type, Contractor's Construction Schedule within 10 days of date established for the Notice to Proceed. Base schedule on the Preliminary Construction Schedule and whatever updating and feedback was received since the start of Project.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.

C. Initial Issue of Schedule: Prepare initial network diagram from a list of straight "early start-total float" sort. Identify critical activities. Prepare tabulated reports showing the following:

1. Contractor or subcontractor and the Work or activity.
2. Description of activity.
3. Principal events of activity.
4. Immediate preceding and succeeding activities.
5. Early and late start dates.
6. Early and late finish dates.
7. Activity duration in workdays.
8. Total float or slack time.

D. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:

1. Identification of activities that have changed.
2. Changes in early and late start dates.
3. Changes in early and late finish dates.
4. Changes in activity durations in workdays.
5. Changes in the critical path.
6. Changes in total float or slack time.
7. Changes in the Contract Time.

2.4 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:

1. List of subcontractors at Project site.
2. Equipment at Project site.
3. Material deliveries.
4. High and low temperatures and general weather conditions.
5. Accidents.
6. Stoppages, delays, shortages, and losses.
7. Meter readings and similar recordings.
8. Orders and requests of authorities having jurisdiction.
9. Services connected and disconnected.

10. Equipment or system tests and startups.

B. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a request for interpretation on a standard Project RFI Form. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule each month together with the Contractor’s Application for Payment.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made.
2. As the Work progresses, indicate Actual Completion percentage for each activity.

B. Distribution: Distribute copies of approved schedule to Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 01 32 00

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. See Section 01 73 00 Execution for progress cleaning requirements.

1.2 DEFINITIONS

A. Permanent Enclosure: As determined by Architect, permanent or temporary roofing is complete, insulated, and weather tight; exterior walls are insulated and weather tight; and all openings are closed with permanent construction or substantial temporary closures.

1.3 USE CHARGES

A. General: Cost or use charges for temporary facilities shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Separate Prime Site Work Contractor, Architect, testing agencies, and authorities having jurisdiction.

1.4 QUALITY ASSURANCE

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

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.5 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Chain-Link Fencing: No chain-link fencing is included in the project requirements. The contractor may erect chain-link security fencing at his discretion, and own cost.

2.2 TEMPORARY FACILITIES

A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

B. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
2. Heating Units: Listed and labeled for type of fuel being consumed, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

1. Locate facilities to limit site disturbance as specified in Division 01 Section "Summary of the Work."

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

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

1. Contractor to furnish all temporary utilities as required for the proper and expeditious performance of the work.

2. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

3. Contractor shall pay for connection, maintenance, and attendance required thereby.

B. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.

C. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

D. Heating: Provide temporary heating 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 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 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 electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.

1. Install electric power service overhead, unless otherwise indicated.
2. Permanent utilities shall be assumed by Food Lion after start-up of the compressor units, approximately 3 ½ weeks prior to Grand Opening date.

G. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

H. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install two (2) telephone line(s) for each field office.

1. Provide additional telephone lines for the following:

    a. Provide a dedicated telephone line for each facsimile machine and computer modem in each field office.

2. At each telephone, post a list of important telephone numbers including police and fire departments, Contractor's home office, Architect's office, Owner's office, and Principal subcontractors' field and home offices.
3. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

I. Electronic Communication Service: Provide temporary electronic communication service, including electronic mail in field office.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. The Contractor shall furnish and maintain all equipment such as temporary stairs, ladders, ramps, scaffolds, hoists, runways, derricks, chutes, etc., as required for the proper execution of the work.
2. Provide incombustible construction for offices, shops, and sheds located within construction area or within 30 feet of building lines. Comply with NFPA 241.
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.
4. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.
5. All such apparatus, equipment, and construction shall meet all requirements of the labor law and other state, federal, or local laws applicable thereto.

B. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

C. Parking: Dedicate a portion of the construction site for temporary parking areas for construction personnel.

D. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties nor endanger permanent Work or temporary facilities.
2. Remove snow and ice as required to minimize accumulations.

E. Project Identification and Temporary Signs: Provide Project identification and other signs as indicated on Drawings. Install signs where indicated to inform public and individuals seeking entrance to Project. Unauthorized signs are not permitted.

1. Provide temporary, directional signs for construction personnel and visitors.
2. Maintain and touchup signs so they are legible at all times.

F. Waste Disposal Facilities: Provide waste-collection and recycling containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with Section 01 73 00 Execution for progress cleaning requirements.

G. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

H. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.

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.

B. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.

C. Stormwater Control: Comply with authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

D. Tree and Plant Protection: To be provided and installed by the separate Site Work Contractor. Protect tree root systems from damage, flooding, and erosion.

E. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and 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.

F. Site Enclosure Fence: When excavation begins, coordinate the installation of a site enclosure fence, provided and installed by the Site Work Contractor, to prevent people and animals from entering the site except by entrance gates.

1. Extent of Fence: As indicated on the Civil Drawings.

G. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

3.5 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

C. Temporary Facility Changeover: 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 property of Contractor. Owner reserves right to take possession of Project identification signs.
2. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 01 77 00 Closeout Procedures and 00 50 00 Form of Agreement.

END OF SECTION 01 50 00

SECTION 01 73 00 - EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. Field engineering and surveying.
3. General installation of products.
4. Progress cleaning.
5. Starting and adjusting.
6. Protection of installed construction.
7. Correction of the Work.

B. See Division 01 Section "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

1.2 SUBMITTALS

A. Certificates: Submit certificate signed by land surveyor or professional engineer certifying that location and elevation of site preparation and improvements by the separate Site Work Contractor comply with Civil requirements.

B. Final Property Survey: Submit a final property survey showing significant features (real property) for Project.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.

1. Before construction, verify the location and points of connection of utility services.

B. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; and underground electrical services.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

C. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
2. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
3. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
4. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to the Food Lion Construction Manager. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.

B. General: Engage a land surveyor or professional engineer to lay out the Work using accepted surveying practices.

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
3. Inform installers of lines and levels to which they must comply.
4. Check the location, level and plumb, of every major element as the Work progresses.
5. Notify Owner when deviations from required lines and levels exceed allowable tolerances.
6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
7. Coordinate with section 31 20 00 “Earth Moving”

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

B. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.

1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.

C. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.

D. Final Property Survey: Prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor or professional engineer, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.

1. Recording: At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

3.5 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

G. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Food Lion Construction Manager.
2. Allow for building movement, including thermal expansion and contraction.

3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F.
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.

1. Provide up to two (2) dumpster pulls for Food Lion vendors, if additional pulls are required, the cost will be adjusted via change order. Proof will be required before the Owner will approve and pay the change order.
2. It shall be the responsibility of the contractor to promptly remove all rubbish or debris caused by his work.

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

K. Final turnover cleaning to be performed by a sub-contractor in the express professional business of cleaning buildings under construction.

3.7 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Division 01 Section "Quality Requirements."

3.8 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

1. The General Contractor shall protect the glass, mirrors, and aluminum trim of every nature, resilient material and all miscellaneous items until the owner formally occupies the building

2. Comply with manufacturer's written instructions for temperature and relative humidity.

3.9 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 01 Section "Cutting and Patching."

1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

B. Restore permanent facilities used during construction to their specified condition.

C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.

D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

F. General Contractor shall warranty the national account items.

END OF SECTION 01 73 00

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. American Concrete Institute (ACI). Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials"
2. ACI 211, “Proportioning Concrete Mixtures”
3. ACI 301, "Specifications for Structural Concrete"
4. ACI 302, “Guide for Concrete Floor and Slab Construction”
5. ACI 305, “Hot Weather Concreting”
6. ACI 306, “Cold Weather Concreting”
7. ACI 315, “Details of Concrete Reinforcement Reinforced Concrete Structures”
8. ACI 318, “Building Code Requirements for Structural Concrete"
9. ACI 347, “Recommended Practice for Concrete Formwork”

B. American Society for Testing and Materials (ASTM):

1. A185, “Welded Steel Wire Fabric for Concrete Reinforcement”
2. A615, “Deformed and Plain Billet-Steel Bars for Concrete Reinforcement”
3. C29, “Unit Weight of Aggregate”
4. C31, “Making and Curing Concrete Test Specimens in the Field”
5. C33, “Concrete Aggregates”
6. C39, “Compressive Strength of Cylindrical Concrete Specimens”
7. C94, “Ready-Mixed Concrete”
8. C125, “Concrete and Concrete Aggregates; Definition of Terms Relating to”
9. C136, “Sieve or Screen Analysis of Fine and Coarse Aggregates”
10. C143, “Slump of Portland Cement Concrete”
11. C150, “Portland Cement”
12. C172, “Sampling Fresh Concrete”
13. C260, “Air-Entraining Admixtures for Concrete; Specifications”
14. C309, “Liquid Membrane-Forming Compounds for Curing Concrete”
15. C476, “Mortar and Grout for Reinforced Masonry”
16. C1107, “Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-Shrink)
17. D75, “Sampling Aggregates”
18. D1751, “Preformed Expansion Joint Fillers for Concrete Paving Structural Construction (Non-Extruding and Resilient Bituminous Types)”
19. D1752, “Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction”
20. E1155, “Test Method for Determining Floor Flatness and Floor Levelness”
21. E1745, "Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs”
22. E1643, "Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs”

C. Concrete Reinforcing Steel Institute (CRSI) “Manual of Standard Practice”

D. All of the applicable publications listed herein shall be in reference to the latest edition and/or amendment.

1.2 SUMMARY:

A. Section includes:

1. Testing Procedures
2. Reinforcement
3. Concrete Materials
4. Concrete Mixture Design
5. Formwork
6. Setting of Sleeves, Anchor Bolts, Inserts and Additional Items
7. Membrane vapor barrier under slabs on grade
8. Placement Procedures
9. Finishes
10. Column Footings, Wall Footings, and other Foundations
11. Cast-in-Place Walls and Grade Beams
12. Interior Slab on Ground (as indicated on drawings)
13. Exterior Slab on Ground
14. Concrete Curing
15. Liquid Densifier/Sealer
16. Grout for Columns
17. Masonry Grout
18. Interior / Exterior Concrete Repair

B. Related Sections:

1. Section 31 20 00 "Earth Moving" for Drainage Fill Under Slabs-on-Grade.
2. Section 32 13 13 “Concrete Paving

1.3 ACTION SUBMITTALS:

A. The following items shall be submitted to the Architect / Engineer. Review by Food Lion is not required.

B. Shop drawings

1. Shop drawings for reinforcing steel and accessories shall be submitted in accordance with ACI 315 and CRSI. Shop drawings shall include all support bars, chairs, and accessories to maintain proper clearances. Reproduction of contract drawings in any form will NOT be accepted.

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

1. Manufacturer’s data shall be submitted for the following products:

a. Chemical admixtures
b. Form-release agents
c. Curing and sealing materials
d. Liquid densifier/sealer
e. Semi-rigid polyurea joint filler
f. Non-shrink grout

D. Test Reports/Certificates shall be submitted for tests and inspections specified herein.

1.4 QUALITY ASSURANCE:

A. Ready Mix Concrete Qualifications: A firm experienced in producing ready-mixed concrete that complies with ASTM C 94 and NRMCA's, "Certification of Ready Mixed Concrete Product Facilities, requirements for production facilities and equipment. Certification shall not be more than twelve months old. Comply with ACI 301, unless modified by the requirements of the Contract Documents.

B. Testing Agency Qualifications: An independent agency, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548. Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.
2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.

C. Concrete Subcontractor Qualification: The Concrete Subcontractor crew responsible for placing and finishing concrete for the interior sales floor slab shall include a minimum of three (3) crewmembers that are certified by the American Concrete Institute as Concrete Flatwork Finishers, or by the American Society of Concrete Contractors. Concrete Subcontractor shall include in their bid package to the General Contractor, their certification numbers, sufficient proof of certification that clearly indicates the concrete subcontractor's ability to achieve the floor slab tolerances specified herein. The Concrete Subcontractor's crew proposed for the work specified herein shall have participated in the majority of the referenced projects, and that crew foreman and crew shall remain the same for every placement of concrete through the duration of this project.

D. Pre-Concrete Floor Slab Conference: At least 28 days prior to the start of concrete slab construction, the General Contractor shall conduct a meeting at the project site to review all aspects of concrete work specified herein. The General Contractor shall send a pre-concrete conference agenda (at the end of this section), to all attendees 10 days prior to the scheduled date of the conference.

1. The contractor shall require responsible representatives of every party concerned with the concrete work to attend the conference, including but not limited to the following:

    a. General Contractor's Superintendent and Project Manager
    b. Testing Agency responsible for concrete mix design(s)
    c. Testing Agency responsible for field quality control
    d. Concrete Subcontractor (Crew Foreman)
    e. Subgrade Subcontractor
    f. Ready-mix Concrete Producer
    g. Admixture Manufacturer
    h. Liquid Densifier/Sealer Manufacturer
    i. Approved Liquid Densifier/Sealer and Polishing Applicator
    j. Joint Filler Manufacturer
    k. Approved Joint Filler Applicator
    l. Owner's Representative

2. Pre-Pour Conference Minutes:

    a. Within five days of the meeting, Minutes of the meeting shall be recorded, typed, and distributed by the General Contractor to all concerned parties, including the Owner's Representative.
    b. The minutes shall include a statement by the Concrete Supplier stating that the proposed concrete mix design(s) will produce the concrete quality required by these specifications.
    c. The minutes shall include a statement by the Concrete Subcontractor that the proposed concrete mix design(s) will provide appropriate workability and setting times, to ensure that the Concrete Subcontractor can achieve the requirements of this specification.

E. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/ D1.4M, "Structural Welding Code - Reinforcing Steel."

F. Testing and Inspections:

1. General: All concrete materials subject to testing and approval by the Owner's Representative shall be approved prior to start of concrete work. The ready-mix concrete company shall furnish cement mill laboratory tests, aggregate gradation reports, and affidavits as required by the project specifications. Daily tests shall be made in the field as specified. The Owner's Representative shall have access to areas where concrete materials are stored, proportioned, mixed, or placed.
2. Concrete Mix Designs: The General Contractor shall retain the services of an experienced Testing Agency to design or verify the proposed concrete mix for each class of concrete specified. The mix design shall be proportioned in accordance with "Proportioning on the Basis of Field Experience and/or Trial Mixtures" of ACI 318 to produce a workable mix which can be placed without honeycombing. When Field Experience is not available, concrete mixes shall achieve an average compressive strength 1200psi higher than the specified strength. This over-design shall be increased 1400psi when concrete strengths over 5000psi are

used. The proposed mix designs shall be accompanied by complete standard deviation analysis or trial mixture test data.

3. Cement: As required by ASTM C150, mill tests on each shipment shall be submitted as requested.
4. Coarse and Fine Aggregates: Sampling of each shipment shall be required in accordance with ASTM D75 as requested. Testing Agency technician shall visit the ready-mix plant one day prior to each scheduled concrete placement to verify that sufficient coarse aggregate and sand is available and adequately protected from inclement weather to complete the next concrete placement.
5. Compression Tests:

    a. An approved Testing Agency shall conduct cylinder testing at no additional expense to Food Lion. Not less than six tests for each 50 cubic yards of concrete or fraction thereof, for each class of concrete placed will be required, and in any event not less than one test of each day's placement of each class of concrete. Four specimens will be made for each test in accordance with current ASTM Specifications C39, C31, and C172. Each cylinder shall be labeled at job, noting the building location where sample was taken, the designated strength, and the date.
    b. Standard age of tests shall be 28 days. Two cylinders shall be tested at 7 days for information and two cylinders at 28 days for acceptance.
    c. The strength level shall be considered satisfactory when the average of all sets of three (3) consecutive strength test results equal or exceed the specified f'c and no individual strength test result falls below the specified strength f'c by more than 500psi. If any 28-day test results do not achieve the required strength level, the Owner’s Representative shall have the right to order changes in proportions of the concrete mix for the remaining portion of structure. In addition, and at no additional cost to Food Lion, the Owner’s Representative may require tests in accordance with ASTM C42, or order load tests for portion of structure where questionable concrete has been placed. Load tests shall be in accordance with ACI 318, and criteria of acceptability of concrete under test shall be that given therein. Should such specimens fail to develop minimum strengths specified, faulty concrete shall be replaced at the General Contractor's expense.
    d. Slump tests: Slump tests shall be made for each compression test and shall conform to ASTM C143.
    e. In addition to the information required by ASTM C39, concrete tests shall include the slump, air temperature, concrete temperature, and the air content and admixture where applicable. Air content for air-entrained and non-air entrained concrete mixes shall be checked on the first three loads of each day’s placement.
    f. It shall be the responsibility of the General Contractor to notify the Owner’s Representative and the Testing Agency 24 hours minimum prior to placing of any concrete.

PART 2 - PRODUCTS

2.1 CONCRETE FORM WORK:

A. General: Forms shall conform to shape, lines, and dimensions of members specified herein and shall be strong and tight to prevent leakage of materials. All forms shall be properly braced or tied together to maintain their positions and shape during concrete placement and consolidation. General Contractor shall be responsible for the design and construction of all formwork, unless noted otherwise. Pre-formed metal keyways are NOT allowed.

B. Forms of column footings, wall footings, and framed slabs on ground may be omitted when the soil and workmanship permit accurate excavation to size, and the omission shall be approved by the Owner's Representative after inspection. Where floor construction of building is to be placed on fill, the fill acting as a form, the fill shall be thoroughly compacted and brought up to the level of the underside of the higher slab.

C. Holes remaining after removal of forms shall be cleaned, roughened, and filled solid with the specified patching material. Patching material shall be wet cured. Any patches that shrink and/or crack shall be removed and replaced at the General Contractor's expense.

2.2 STEEL REINFORCEMENT:

A. Reinforcing Bars: ASTM A615/A615M, Grade 60, deformed unless noted otherwise on drawings.

B. Plain-Steel Welded Wire Reinforcement: ASTM A185/A185M, plain, fabricated from as-drawn steel wire into flat sheets.

C. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M, flat sheet.

D. Welded wire fabric shall have a minimum yield strength of FY=60,000psi. Wire fabric shall be lapped in accordance with the provisions of ACI 318. Size of wire fabric shall be as indicated on the drawings.

E. 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.

F. Bars shall be accurately bent and placed as indicated on the drawings and securely supported and fastened to prevent movement during the placement of concrete. Minimum lap shall be (30) bar diameters unless otherwise dimensioned on drawings. Bends shall conform to the American Concrete Institute.

G. Steel Fabrication: Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.3 CONCRETE MATERIALS:

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, Type I, gray

a. The use of fly ash is not permitted

B. Normal-Weight Aggregates: ASTM C 33, graded.

1. Shall conform to ASTM C 33 and be free of materials with deleterious reactivity to alkali in cement. Provide aggregates from a single source. Fine aggregate shall have a fineness modulus range of 2.5 to 3.0. Combined aggregate gradation for interior floor slab and other designated concrete shall be 8% - 18% for large top size aggregates (1½") or 8% - 22% for smaller top size aggregates (1" or ¾") retained on each sieve below the top size and above the No. 100 sieve.

C. Water: ASTM C 94/C 94M and potable.

2.4 CHEMICAL ADMIXTURES:

A. Air-Entraining Admixture: ASTM C 260.

1. Acceptable products:

a. Euclid Chemical: “AEA-92” or “Air 40”
b. BASF: “Micro Air” or “MBAE-90”
c. WR Grace: “Daravair” or “Darex-II”

2. Air-entraining mixtures shall not be used for interior concrete.

B. Water Reducing Admixtures: ASTM C 494/C 494M, Type A. Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Acceptable products:

a. Euclid Chemical: “Eucon Series”
b. BASF: “Pozzolith Series”
c. WR Grace: “WRDA” or “Daracem”

C. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.

1. Acceptable products:

a. Euclid Chemical: “Retarder 75”
b. BASF: “Pozzolith Series” or “Delvo”
c. WR Grace: “Daratard 17”

D. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.

1. Acceptable products:

a. Euclid Chemical: “Eucon 37” or “Plastol Series”
b. BASF: “Rheobuild 1000” or “Glenium Series”
c. WR Grace: “Daracem 100” or “Adva Flow”

E. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.

1. Acceptable products:

a. Euclid Chemical: “Eucon 537” or “Plastol Series”
b. BASF: “Rheobuild 1000” or “Glenium Series”
c. WR Grace: “Daracem 100” or “Adva Flow”

F. Water Reducing, Non Corrosive Accelerating Admixture: ASTM C 494, Type C or E.

1. Acceptable products:

a. Euclid Chemical: “Accelguard Series”
b. BASF: “Pozzutec 20” or “NC534”
c. WR Grace: “Polarset”

2. All concrete slabs placed at air temperatures below 50 degrees shall contain the non-corrosive accelerator.

G. Prohibited Admixtures:

1. Calcium Chloride, thiocyanates or admixtures containing more than 0.05% chloride ions.
2. Fly Ash, slag and bottom ash.
3. Certification: Written conformance to the prohibited admixtures will be required from the admixture manufacturer prior to mix design review by the engineer.

2.5 VAPOR RETARDER:

A. Vapor Retarder shall conform to the requirements of ASTM E 1745, Class C, water vapor permeance of less than 0.03 perms [grains/(ft^2 · hr · inHg)] as tested in accordance with mandatory conditioning tests per ASTM E1745 Section 7.1 (7.1.1-7.1.5). Include manufacturer’s recommended adhesive or pressure-sensitive tape, and accessories.

1. Acceptable Product:

a. Stego Wrap Class C Vapor Retarder (10-mil) by Stego Industries, LLC (877) 464-7834 www.stegoindustries.com.
b. Moistop Ultra 10 Class A Vapor Retarder (10-mil) by Fortifiber Building Systems Group, (800)773-4777 www.fortifiber.com

2.6 CURING MATERIALS:

A. Interior Curing: The interior sales floor slab shall be cured using a reduced odor, dissipating or removable liquid membrane forming curing compound. The dissipating or removable liquid membrane forming curing compound shall meet the requirements of ASTM C-309 and VOC contents in accordance to EPA 40cfr, part 59, and table 1, subpart D for concrete curing compounds with a maximum VOC content of 350g/l.

1. Acceptable product:

a. Euclid Chemical: “Kurez DR VOX” or “Kurez RC and Kurez RC-OFF”

B. Exterior Curing and Sealing : Clear Curing and Sealing Compound (350 g/l): Liquid type membrane forming curing compound, clear styrene acrylate type, complying with ASTM C1315, Type I, Class A, 25% solids content minimum. Moisture loss shall be not more than 0.40 Kg/m^2 when applied at 300sf/gallon. Manufacturer's certification is required.

1. Acceptable Products:

a. Euclid Chemical: "Super Diamond Clear VOX"
b. BASF: "Kure-N-Seal WB-30”

2.7 RELATED MATERIALS:

A. Evaporation Retarder: Spray-applied, waterborne, monomolecular film, to aid in the prevention of rapid moisture loss from fresh concrete during the finishing operations.

1. Acceptable Product:

a. Euclid Chemical: “Eucobar.”

B. Polyurea Joint Filler: Semi-Rigid Polyurea joint filler shall be applied to all slab on grade construction and control Joints in exposed concrete areas. Fill joints full depth with 100% solid UV Resistant compound with a minimum Shore “A” Hardness of 50.

1. Acceptable product:

a. Euclid Chemical: “QWIKjoint UVR 65”
b. All control / construction joints located underneath perimeter “cases” shall be filled prior to “case” installation. All other joints shall be filled prior to “gondola” installation.

C. Form releasing agent: V.O.C. compliant, non-staining, suitable for forms being used (oil base is unacceptable). One approved type of form release agent shall be used throughout the project.

D. Expansion joints: Pre-molded expansion joint backer rods, conforming to ASTM-1751 for interior work and ASTM-D 1752 for exterior work, thickness as indicated on the drawings. ASTM C920 for single cured cold applied elastomeric joint sealants.

E. Liquid Densifier/Sealer: High performance, deeply penetrating concrete densifier; odorless, colorless, VOC - compliant, non-yellowing siliconate based solution designed to harden, dustproof and protect concrete floors. The compound must contain a minimum solids content of 20% of which 50% is siliconate.

1. Acceptable Liquid densifier/sealer Manufacturer:

a. Euclid Chemical: “Euco Diamond Hard” Contact: Phil Brandt (877) 438-3826.
b. Approved Applicator: All General Contractors bidding or negotiating this project shall contact The Euclid Chemical Company to obtain a list of Approved Applicators located within the geographic region of the project. General Contractors shall solicit and accept pricing only from those Applicators as inclued in the Manufacturer’s list.

2.8 REPAIR MATERIALS (NEW AND REMODEL):

A. Interior Self-Leveling Underlayment: Single component, self-leveling underlayment suitable for applications from featheredge to 1” in depth and requiring only the addition of water.

1. Acceptable Product:

a. Euclid Chemical: “Super Flo-Top” or “Tamms SLU”

B. Interior Self-Leveling Overlayment: Single component, cementitious, self-leveling decorative topping suitable for applications from ¼" to 1" depth neat, or deeper with the addition of pea gravel, and requiring only the addition of water.

1. Acceptable Product:

a. Euclid Chemical: “LevelTop SP”

C. Crack Repair: Two-component hybrid urethane repair liquid used to mend cracks in concrete, repair spalled joints and repair damaged or uneven concrete surfaces. Two-component hybrid urethane shall be a fast cure, ultra-low viscosity material formulated to penetrate deep into cracks, mending them back together. Two-component hybrid urethane shall mix with aggregate to produce a tough mortar and shall accept color paks for coloring.

1. Acceptable Product:

a. Euclid Chemical: “QWIKstitch” (Cracks smaller than ¼")
b. Euclid Chemical: "QUIKjoint UVR65" (Cracks ¼" and larger)

D. Concrete Repair Adhesive: The adhesive shall be a three component, pre-portioned water-based epoxy modified Portland cement bonding agent and anti-corrosion coating.

1. Acceptable three component bonding agent and anti-corrosion coating:

a. Euclid Chemical: “Duralprep AC”

E. Concrete Repair Sealer:

1. Liquid Densifier/Sealer:

a. Shall be Euclid Chemical, “Euco Diamond Hard”. Shall be used in produce prep and cooler, when concrete floor conditions are acceptable. Apply according to manufacturer's written instructions

2. Polyurea Sealer:

a. Shall be Spartacote Flex Pure. Shall only be used in produce prep and cooler, when concrete floor is in poor visible condition (as required by local AHJ/coordinate with Food Lion Construction Manager). Apply according to manufacturer's written instructions

F. Horizontal Patching Mortars: The horizontal patching mortar shall be one-component latex and microsilica modified cementitious mortar designed for use as a floor or deck topping.

1. Acceptable one component horizontal patching mortar:

a. Euclid Chemical: “Thin Top Supreme” or “Concrete Top Supreme”

G. Vertical Patching Mortars: The vertical patching mortar shall be one-component latex and microsilica modified cementitious mortar designed for use as a vertical or overhead patching mortar.

1. Acceptable one component vertical and overhead patching mortar:

a. Euclid Chemical: “Verticoat,” “Verticoat Supreme” or “Speed Crete Red Line”

H. Sidewalk Repair: Repair mortar shall be a polymer modified, fiber reinforced concrete resurfacing mortar. Repair mortar shall provide a fresh, aesthetically pleasing appearance to concrete that is old, spalled or has been damaged by salt.

1. Acceptable Products:

a. Euclid Chemical: Euco “Re-Cover”
b. Surecrete Design Products: “SureSpray”

I. Penetrating Sealer for Exterior Concrete: Water-based, oligomeric siloxane/silane, ready to use, deep penetrating water repellent. Water repellency is achieved via an impregnation of the substrate. Penetrating sealer shall be colorless, odorless, non-staining, and non-yellowing and non-film forming penetrant used to protect concrete surfaces without altering the appearance or texture of the treated surface. Initial application shall be 150 sf / gallon. (Improves resistance to deicing salts)

1. Acceptable Product:

a. Euclid Chemical: “WB244”

J. Non-shrink grout under all steel column base plates, equipment bases, and other locations noted on the structural drawings shall be grouted with the specified non-shrink grout. The grout shall conform to ASTM C 1107. In addition, the grout manufacturer shall furnish test data from a Testing Agency indicating that the grout, when placed at a fluid consistency, shall achieve 95% bearing under a 4' x 4' base plate. All non-shrink grout shall be non-metallic.

1. Acceptable Products:

a. Euclid Chemical: "Euco NS" (non-metallic)
b. BASF: "Masterflow 928" (non-metallic)

2. Grout shall be mixed with an approved paddle type mortar mixer to a consistency for rapid, continuous, and complete filling of space to be grouted.
3. Grout shall be properly placed as approved by Owner’s Representative and cured per manufacturer's written instructions.

2.9 CONCRETE MIXTURES:

A. Prepare design mixtures for each type and strength of concrete as required by ACI 301, including laboratory trial mixtures or field test data.

1. Admixtures: Use admixtures according to manufacturer's written instructions.

a. As required, use water-reducing or high-range water-reducing admixture in concrete for placement and workability.
b. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
c. Use high-range water-reducing admixture in pumped concrete, watertight concrete and concrete with a water-cement ratio below 0.45.

B. Proportion normal-weight concrete mixture as follows

1. The mixing, placing, testing and curing of all the concrete work shall conform to the current requirements of ACI 318 and ACI 301.

a. The specified strength of concrete to be used for the project shall be as shown on the drawings. The minimum strength for any concrete not otherwise specified shall be 3,000psi.

2. All concrete subjected to freezing and thawing shall have a maximum water/cement ratio of 0.50 (4000 psi @ 28 days or more). All concrete subjected to deicers and/or required to be watertight shall have a maximum water/cement ratio of 0.45 (4500 psi @ 28 days or more) and contain between 4 to 6% entrained air. All reinforced concrete subjected to brackish water, salt spray, or deicers shall have a maximum water/cement ratio of 0.40 (5000 psi @ 28 days or

more). All concrete subject to freezing and thawing shall contain the specified air-entraining admixture.

3. Adjustment to Concrete Mixes: Mix design adjustments may be requested when characteristics of materials, job conditions, weather, test results or other circumstances warrant; at no additional cost to Food Lion and as accepted by Food Lion. Testing Agency test data for revised mix design and strength results must be submitted to and accepted by Food Lion, prior to use. The concrete Testing Agency and the Concrete Subcontractor shall be satisfied that the proposed concrete mix shall produce concrete that meets the requirements for this project. In addition, the General Contractor and Concrete Subcontractor shall verify that the workability, finishability and setting times are appropriate for slab installations. Placement shall be made by chute directly from concrete trucks. If pumping of the concrete is contemplated for any special locations, the proportions established above shall not be altered to suit the capabilities of the pumping equipment.
4. Interior Concrete Sales Floor: Unless indicated otherwise on the drawings, concrete shall be designed to meet 3000 psi compressive strength @ 28 days and exhibit <0.04% shrinkage @ 28 days. The mix shall contain approximately 11.5 cubic feet of coarse aggregate (1½" top size), the specified water reducing admixture and achieve a W/Cm ratio of 0.53 (Max). Concrete shall be non air-entrained and in no case shall the concrete be designed for less than 3000 psi @ 28 days. Proposed mix design shall be similar to the following prototype mix:

Material	**Prototype Mix**
Cement	470-517lbs.
Fly Ash/Slag	Prohibited
Coarse Aggregate	11.5 Cubic Feet +/- .50
Fine Aggregate	7 Cubic Feet +/- (Adjust as Necessary)
Water Content	249 – 275lbs.
Air Content (Entrapped Air Only)	3.0% (Max. for Interior Sales Floor Slab)
Mid-Range Water Reducer (Type A/F)	3oz. - 10oz. / 100wt
W/cm	0.53 (Max)
Initial Slump (Water)	3"
Final Slump	5" (Max)
Shrinkage	≤ 0.04% @ 28 days

5. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

2.10 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M, and furnish batch ticket information.

1. When air temperature is between 85 and 90°F (30 and 32°C), reduce mixing and delivery time from 1½ hours to 75 minutes; when air temperature is above 90°F (32°C), reduce mixing and delivery time to 60 minutes.
2. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94. Mix concrete materials in appropriate drum-type batch machine mixer.

B. Batch Tickets: Provide batch ticket for each batch discharged and used in the work, indicating project identification name and number, date, mix type, mix time, quantity, and amount of water added. The batch ticket shall state the quantity of water that may be added at the jobsite without violating the submitted mix design criteria, including water/cement ratio. Concrete Testing Agency Technician shall be responsible for collecting batch tickets and recording the location of load placement and the associated batch ticket.

2.11 INTERIOR CONCRETE SLAB BASE AND VAPOR BARRIER INSTALLATION:

A. Crushed stone base shall be placed beneath all interior slabs on grade and shall consist of a 4" minimum blanket of crushed stone conforming to ASTM D1241. If the geotechnical report requires more than 4" of crushed stone, the greater thickness shall be used. Crushed stone shall be placed, compacted and brought to required grade.

2.12 EXTERIOR CONCRETE SLAB BASE:

A. Crushed stone base shall be placed beneath all exterior slabs on grade and shall consist of a 6" minimum blanket of crushed stone conforming to ASTM D1241. If the geotechnical report requires more than 6" of crushed stone, the greater thickness shall be used. Crushed stone shall be placed, compacted, and brought to required grade.

2.13 ANCHORS, SLEEVES, CLEANOUTS, AND OTHER WORK:

A. Install all anchors, sleeves, cleanouts, inserts, and other items that must be set in the concrete, so that they are flush with finished floor elevation. Note: Prior to installation, the Owner’s Representative must approve all types of inserts of any nature.

B. General Contractor shall coordinate his work with all other work to be done.

2.14 EXTERIOR CONCRETE SIDEWALK REPAIR

A. Thin concrete overlay

1. Acceptable product – Surecrete Design Products SureSpray with accessory Surecrete products (see Concrete Surface Repairs in PART 3).

PART 3 - EXECUTION

3.1 GENERAL:

A. General Contractor shall refer to the Floor Finish Schedule on the drawings to determine location of finishes.

3.2 PREPARATION OF SURFACES:

A. Rusted steel reinforcement shall be satisfactory provided that the size and weight are not less than applicable ASTM requirements. Once reinforcement is placed, it shall be protected from weather until concrete is placed around it. If reinforcement steel is allowed to rust in the formwork to a degree unacceptable to the Owner's Representative, it shall be removed from the formwork and cleaned to the satisfaction of the Owner's Representative. Steel reinforcement protruding from a concrete placement shall be cleaned and protected until the next placement.

B. Water and all foreign matter shall be removed from forms, reinforcing steel and excavations. Unless otherwise directed, wood forms and sand or sandy loam shall be thoroughly wetted just prior to placing concrete. Concrete shall NOT be placed until all reinforcing steel, pipes, cleanouts, conduits, sleeves, hangers and other work required to be built into concrete are in place and have been inspected and approved by the Owner's Representative. Any approval shall not relieve General Contractor of responsibility for omissions of any nature.

3.3 CONVEYING:

A. Concrete shall be conveyed from the mixer to the place to final deposit by methods that prevent separation or loss of the materials.

B. Equipment for chuting, pumping and pneumatically conveying concrete shall be of such size and design, as to insure a practically continuous flow of concrete at the delivered end without separation of the materials.

3.4 FORMWORK:

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.

1. Chamfer exterior corners and edges of permanently exposed concrete.

3.5 EMBEDDED ITEMS:

A. Specify embedded items and anchorage devices for other work attached to or supported by cast-in-place concrete. Insert specific requirements for installing embedded items, if any that are part of the work. All sales area utilities/penetrations shall be set 1/8" below finished floor to allow for the use of a power trowel machine.

1. 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.

3.6 VAPOR RETARDERS:

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.

1. Unroll vapor retarder with the longest dimension parallel with the direction of the concrete placement and face laps away from the expected direction of the placement whenever possible.

2. Extend vapor retarder to the perimeter of the slab. If practicable, terminate it at the top of the slab, otherwise (a) at a point acceptable to the structural engineer or (b) where obstructed by impediments, such as dowels, waterstops, or any other site condition requiring early termination of the vapor retarder. At the point of termination, seal vapor retarder to the foundation wall, grade beam or slab itself .

3. Lap joints 6" (150 mm) and seal with manufacturers recommended tape.

4. Apply seam tape or other adhesives to a clean and dry vapor retarder.

5. Seal all penetrations (including pipes) per manufacturer’s instructions.

6. Avoid the use of non-permanent stakes driven through vapor retarder.

7. Repair damage areas with vapor retarder material of similar (or better) permeance, puncture resistance, and tensile strength.

3.7 STEEL REINFORCEMENT:

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

3.8 JOINTS:

A. Coordinate joint types, description, and location with Drawings. Joint types have been consolidated in this article for consistency rather than for strict sequence of installation.

B. All joints shall be true to line with faces perpendicular to surface plane of concrete.

C. Construction Joints: Install at locations indicated or as approved by Architect, so strength and appearance of concrete are not impaired.

1. Locate and install construction joints as indicated on drawings. If construction joints are not indicated, locate in a manner that will not impair strength and will have the least impact on appearance. All construction joints will be reinforced with smooth dowels placed perpendicular to construction joint unless details specifically indicate otherwise.

D. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated and as follows:

1. Sawed Joints: Provide sawn floor slab control joints where indicated on the drawings. All floor control joints shall be cut 1 ¼" deep along column center lines and between column center lines as indicated on drawings immediately (as soon as possible) without raveling the joint edge. Saw cuts shall be made up to column edges without damaging the column, and shall be made using the Soff-Cut saw, as manufactured by Husqvarna, or equal. Additional joints shall be installed at corners of interior recessed loading docks and other re-entrant corners and special locations which tend to invite cracks. Refer to project drawings. General Contractor shall prepare a control joint layout for presentation and review at the pre-concrete meeting.

E. 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.

3.9 CONCRETE PLACEMENT:

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be 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.

C. Carbon Monoxide / Carbon Dioxide Exposure: General Contractor shall be responsible for monitoring interior concrete floor exposure to excessive exhaust gases containing carbon dioxide (CO_2) or carbon monoxide (CO). To minimize potential damage to interior concrete floor during slab placement and curing periods,

maximum CO_2 levels shall be 4,500 parts per million and maximum CO levels shall be 15 parts per million at concrete surface within 5 feet of any source of exhaust gases. Unvented combustion heaters shall not be in operation during concrete placement, and equipment inside the building during concrete placement shall be limited to the equipment necessary to place and finish concrete. Only two concrete trucks shall be in the building at any given time, and under no circumstance shall there be any earth moving equipment, dump trucks, grading equipment, or any other motorized equipment in operation until after the interior concrete floor is placed and protected by specified curing method. Carbon Monoxide and Carbon Dioxide shall be checked using an appropriate meter from a company similar to the following: CEA Instruments, Inc., 16 Chestnut Street, Emerson, NJ 07630; Phone (201-967-5660); website: www.ceainstr.com.

D. Concrete shall not be placed on wet or soggy ground without first laying a compacted bed of crushed stone to prevent the mud from mixing with the concrete.

E. Concrete shall be deposited as nearly as practicable in its final position to avoid segregation. Concrete that has partially hardened, become contaminated by foreign materials or that has been re-tempered shall not be used.

F. Continuity of placing: Once concreting is started, it shall be carried on as a continuous operation until the placing of the section is completed. The concreting shall be carried on at such a rate that the concrete is at all times plastic, flows readily into the spaces between the bars and bonds completely with previously placed concrete in the same placement.

G. Consolidation: Concrete shall be thoroughly consolidated and carefully worked around reinforcement and embedded fixtures, along surfaces and into the corners of the forms. Vibrators shall be used in all sections that are 6 inches and thicker and shall be operated under experienced supervision. All formwork shall be constructed to withstand their action.

H. Construction joints: When construction joints other than those shown on drawings are necessary, they shall be made and located with approval of the Architect and additional reinforcing shall be installed as required. All construction joints shall be doweled.

I. Cold-Weather Placement: Comply with ACI 306.

J. Hot-Weather Placement: Comply with ACI 301.

3.10 CONCRETE FINISHES: INTERIOR SALES FLOOR SLAB

A. General: The interior sales floor shall be placed in one continuous concrete placement. Ample lighting shall be provided by the General Contractor so the Concrete Subcontractor can provide the required details for a proper concrete finish, including concrete areas around walls, columns and drains. Identification tags for cleanouts shall not be higher than ¼" from finished floor elevation, so as to not interfere with the final floor finish. Concrete shall be placed, screeded, re-

straightened, and finished as necessary to meet the F_F and F_L requirements. Do not wet concrete surfaces during finishing operations.

1. A well compacted, leveled sub-grade is required. The General Contractor shall follow the recommendations of ACI 302. After multiple passes of a loaded tandem-axle dump truck, a loaded truck mixer, roller or equivalent, any depression in the surface deeper than ½" shall be repaired.
2. Laser screeds, vibratory screeds, highway straightedges and wood bull floats shall be used to initiate screeding and floating process to form a uniform and open-textured surface plane before excess moisture or bleed water appears on the surface. A back-up laser screed is required during concrete placement of the interior sales floor slab. Remove excess water before starting floating operations. Do not further disturb surfaces before starting finishing operations.
3. Highway Straightedge: The surface shall be checked with a highway straightedge to help achieve the specified flatness tolerances. Highway straightedge operations shall continue before, during and after troweling operation, until specified floor tolerances are achieved.
4. Interior Sales Floor Float Procedure: Apply float finish to the interior sales floor using float machines and float shoes. Continue to use Highway Straightedge during float procedures.
5. Interior Sales Floor Trowel Finish: Apply trowel finish using trowel machines with adjustable blades. Use steel-reinforced blades on ride-on power trowels. Use 6" wide finish style steel-reinforced blades on final passes. All trowel blades shall be in new condition and completely clean of any deleterious materials. Machine trowel the surface sufficiently to produce a smooth, tight, abrasion resistant surface. Do not overwork or "burn" the surface. Provide machine troweled finish to within 3" of walls, columns and penetrations. Provide a hand trowel finish from 0" - 3" for same troweled appearance.
6. Curing: Apply the specified curing compound at the specified application rate as soon as final troweling is complete in any given area.
7. Protection: Care shall be taken to protect the interior sales floor. Entrances shall include clean floor mats to prevent mud stains and all equipment on the floor shall be diapered to prevent spills. Cutting oils, etc., are not allowed on the sales floor slab at any time during the construction process.

3.11 FLOOR FLATNESS / LEVELNESS TOLERANCES:

A. All floors shall achieve an overall (MOA) floor flatness of $F_F = 50$ and $F_L = 35$ with minimum local (MLA) F numbers of $F_F = 35$ and $F_L = 24$

1. MLA is defined as 2 column bays wide by 150' or the first construction joint as determined by the Owner's Representative (MLA and Minimum Sales Area Placement are defined the same).
2. All floors shall be measured in accordance with ASTM E-1155.
3. F-number testing is contracted and performed by Food Lion.

3.12 CONCRETE FINISHES (INTERIOR EXPOSED CONCRETE):

A. Concrete floors general: Interior exposed concrete slabs shall be finished as required herein. All sales area utilities/penetrations shall be set 1/8” below finished floor to allow the use of a power screed.

1. Steel trowel finish: Concrete floor surfaces throughout the interior of the buildings unless otherwise specified, shall be machine trowel finished to within 3" of a wall or partition. Provide a hand trowel finish from 0" - 3" for same troweled appearance. Concrete shall be placed, consolidated, floated, struck off and leveled with a Highway Straightedge to the proper elevation. After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and re-straighten 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. Final floor tolerances shall be the same specified in Section 3.11. Apply specified curing compound, and allow curing for a minimum of 7 days. Prior to close-out, clean these surfaces thoroughly and apply an application of liquid densifier / sealer.
2. Broom finish: Interior exposed concrete shall first be given a floated finish and then a steel trowel finish as specified herein, after which it shall be brushed or broomed as necessary. At time of brushing or brooming, the troweled surface shall have hardened sufficiently to retain the scoring or ridges. The brushing or brooming shall be in a direction transverse to that of traffic or at right angles to the slope of the floor slab. Texture shall be as approved by the Owner’s Representative from sample panels. Prior to close-out, clean these surfaces thoroughly and apply an application of liquid densifier / sealer.

3.13 CONCRETE FINISHES (NOT INTERIOR SALES FLOOR):

A. Concrete floors general: Concrete slabs shall be finished as required herein. The dusting of wearing surfaces with dry materials is not permitted. All sales area utilities/penetrations will be set 1/8” below finished floor to allow the use of a power screed.

1. Steel trowel finish: Concrete floor surfaces throughout the interior of the buildings unless otherwise specified, shall be machine trowel finished to within 3" of a wall or partition. Provide a hand trowel finish from 0" - 3" for same troweled appearance. Concrete shall be placed, consolidated, floated, struck off and leveled with a Highway Straightedge to the proper elevation. After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and re-straighten 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.

a. Apply a trowel finish to surfaces at all interior concrete floors.
b. Refer to 3.11 for Floor Flatness/Levelness Tolerances.

2. Struck-off finish: Use struck-off finish for footings, bond beams, and buried surfaces. Sub slabs need not have a steel trowel finish but shall be leveled and compacted with no further finishing.
3. Broom finish: Exterior slabs shall first be given a floated finish and then a steel trowel finish as specified herein, after which it shall be brushed or broomed as necessary. At time of brushing or brooming, the troweled surface shall have hardened sufficiently to retain the scoring or ridges. The brushing or brooming shall be in a direction transverse to that of traffic or at right angles to the slope of the floor slab. Texture shall be as approved by the Owner's Representative from sample panels. Prior to close-out, clean these surfaces thoroughly and apply an application of penetrating sealer. (Improves resistance to deicing salts)
4. 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 re-straightening until surface is left with a uniform, smooth, granular texture.

    a. Apply float finish to surfaces to receive trowel finish and to be depressed to receive freezer panels or quarry tile.

3.14 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 one part Portland Cement to one and one-half 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 will match 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 one part Portland cement and one 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 will match 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.

3.15 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306 for cold-weather protection and ACI 301 for hot-weather protection during curing. Concrete damaged by freezing shall be removed and replaced under this section of specifications.

B. Evaporation Retarder: Apply specified evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m 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. Cure concrete according to ACI 308, by one of the following methods:

1. All interior concrete slabs shall be cured using the specified reduced odor, dissipating/removable liquid membrane forming curing compound. Apply at a rate of 400sf/gallon.
2. All exterior concrete slabs shall be cured using the specified liquid membrane-forming curing compound, applied evenly and uniformly per manufacturer’s specifications as soon as possible after final finishing. Concrete surface shall be damp, but not wet and can no longer be marred by walking workmen. All applications shall be made by an experienced applicator, and when surface and air temperature are above 50 degrees F.
3. Take the following measures to protect interior sales floor slab: Wrap and/or “diaper” all motorized and hydraulic equipment to prevent fluid leaks. Provide non-marking tires on rubber-tired vehicles or equip rubber tires with tire boots made of nylon fabric.
4. The General Contractor shall remove all stains and debris from the slabs to the satisfaction of the Owner’s Representative.

3.16 INSTALLATION OF SEMI-RIGID POLYUREA JOINT FILLER:

A. Approved Applicator: All General Contractors bidding or negotiating this project shall contact The Euclid Chemical Company to obtain a list of Approved Applicators located within the geographic region of the project. General Contractors shall solicit and accept pricing only from those Applicators as included in the Manufacturer’s list. Euclid Chemical must approve the joint filling applicator, prior to application. Building shall be enclosed and climate controlled prior to joint filler installation.

B. Joint Filler Installation: Comply with recommendations in ACI 302 for use of joint filler as applicable to materials, applications, and conditions indicated. Delay joint filling application as long as possible.

1. Cleaning: The joint must be clean and dry. All oil, dirt, debris, paint, and any other material that may be a bond breaker must be removed from the joint surfaces, prior to joint filler application.
2. Mixing: The specified joint filler is a two-part product requiring machine mixing and placing. Premix Part A and B separately before using. Follow pump manufacturer's equipment instructions.
3. Placement: Joint filler shall be placed full depth. BACKER ROD IS NOT ALLOWED. Joints should be overfilled and shaved even with the surrounding joint edge giving the floor joints a flat, smooth appearance.
4. Depth of Joint Filler (Control Joints): For proper load transfer, joints must be filled full depth (bottom of sawcut), but in no case shall the joint filler be less than 1¼" deep in a control joint.
5. Depth of Joint Filler (Construction Joints): For proper load transfer, joints must be filled full depth (bottom of sawcut). Depending on opening, sand may be used to fill the joint within 2" below finished floor. In no case shall the joint filler be less than 2" deep in a construction joint.

C. Random Testing: The Testing Agency shall take a minimum of 10 random tests of the joint filler material to ensure that no backer rod is installed at sawcuts.

3.17 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by the Owner's Representative. Remove and replace concrete that cannot be repaired and patched to the Owner Representative's approval.

B. Underlayment Compound: After proper surface preparation, apply free-flowing, self-leveling, pumpable cementitious-based compound.

C. Horizontal, Vertical and Overhead Repair Work: Specified repair materials shall be applied per manufacturer's written instructions for all areas that require horizontal, vertical and overhead repair to existing concrete.

D. Sidewalk Repair Work: Apply specified repair material to cover spalling, cracking, patched areas, etc., on exterior concrete sidewalks as called out on drawings or by Owner's Representative. Installation shall be per manufacturer's written instructions. Application requires three (3) products listed below in order.

1. Surecrete Design Products, (800) 544-8488.
    a. Surecrete Design Products SCT-22, Concrete Crack and Spall Treatment.
    b. Surecrete Design Products SureSpray, Commercial grade concrete thin overlay.
    c. Surecrete Design Products SureDeck, 30% solids pigmented solvent acrylic sealer.

2. Finish: Pebble texture.
3. Color: As noted on drawings.

3.18 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. The following information is required by the General Contractor:

		Please check one
Based on Standard Deviation Analysis		
Trial Mix Test Data		

DESIGN CHARACTERISTICS

Density		pcf
Strength		psi (28 day)
Air		% specified

If trial mixes are used the Mix Design is proportioned to achieve f'cr = f'c + 1200 psi
(1400 psi for strength higher than 5000 psi at 28 days)

MATERIALS	Type/ Source	Specific Gravity	Weight/lb.	Absolute Vol. cu.ft.
Cement				
Coarse Aggregate				
Fine Aggregate				
Water				
Other				
		TOTAL		27.0 cu. ft.

* Water/Cement Ratio (lbs. water/lbs. cement) = _____%

ADMIXTURES	Manufacturer	Dosage oz/cwt
Air Entraining		
Water Reducing		
Water Reducing, Retarding		
High Range Water Reducing		
Non-Corrosive Accelerating		
Other		

Slump before HRWR		*inches*
Slump after HRWR		*inches*

Standard Deviation Analysis (from experience records):

# of Test Cylinders Evaluated:	
Standard Deviation:	

f'cr-f'c + 1.34s or f'cr = f'c + 2.33s - 500
(Refer to ACI 301 for increased deviation factor when less than 30 tests are available)

Slump before HRWR		*inches*
Slump after HRWR		*inches*

Standard Deviation Analysis (from experience records):

# of Test Cylinders Evaluated:	
Standard Deviation:	

f'cr-f'c + 1.34s or f'cr = f'c + 2.33s - 500

(Refer to ACI 301 for increased deviation factor when less than 30 tests are available)

LABORATORY TEST DATA

Compressive Strength	**Age (days)**	**Mix # 1**	**Mix #2**	**Mix #3**
	7	psi	psi	psi
	7	psi	psi	psi
	28	psi	psi	psi
	28	psi	psi	psi
	28 average	psi	psi	psi

REQUIRED ATTACHMENTS

	Please Check
Coarse Aggregate Gradation Report	
Fine Aggregate Gradation Report	
Concrete Compressive Strength Data or Trial Mixture Test Data	
Admixture Compatability certification letter	

Submitted by:

Name:	
Address:	
Phone #:	
Main Plant Location:	
Miles from Project:	
Secondary Plant Location:	
Miles from Project:	
Date:	

PART 4 - Pre-Concrete Conference Agenda

4.1 Testing Agency Procedures:

A. Slump Control

B. Air Content Control

1. Air meter type
2. How often required?

C. Sub-grade testing and report

D. Random Joint Filler Testing

E. Floor profile test

1. Type instrument
2. Path of measuring line
3. Reporting time

4.2 Climate Conditions:

A. ACI 305, “Hot Weather Concrete”

B. ACI 306, “Cold Weather Requirements”

C. Carbon Monoxide / Carbon Dioxide Monitoring (Per Specification)

D. Necessary Mix Design Changes

E. Finishing Technique Changes

F. Evaporation Retardant Usage

4.3 Sub-grade

A. Materials

B. Fill

C. Tolerances

D. Vapor Retarder location (if required)

4.4 Mix Design Review

A. Concrete Strength Requirements

1. Field Experience Method

2. Trial Mixture Method
3. Mix Design Submittal Form Discussion

B. Conventional or Superplasticized Concrete

1. Key Strength Requirements at Early Ages
2. Workability, Finishability and Setting Time Discussion

4.5 Concrete Placing Plan:

A. Method of Placement

1. Pump
2. Truck Deposit

B. Strike-off and Consolidation Procedures

C. Typical Placement Size

1. Typical Length and Width
2. Unusual Areas

4.6 Exterior Concrete:

A. Concrete Strength

1. Compressive
2. Flexural
3. Slump
4. Air Content (Exterior)

B. Placing Procedures

C. Required Finish

D. Thickness Tolerance

E. Curing Process

F. Protection

4.7 Interior Concrete Floor Slab

A. Interior Sales Floor Test Slab

B. Concrete Strength

1. Compressive
2. Flexural
3. Slump

4. Air Content (Entrapped Only!)

C. Placing Procedures

D. Thickness Tolerance

E. Floor Flatness/Levelness Tolerances

F. Dissipating/Removable Curing Compound

G. Densifier/Sealer Application

H. Joint Filling

I. Polishing Process

J. Gloss Measurement Procedures

4.8 Concrete Finishes Required

A. Placement Procedures

B. Floating Operations

C. Troweling Operations

D. Abrasion Resistant Surface

4.9 Contraction and Control Joints

A. Layout of Joints

B. Type of Saw to be Used

C. Time of Cut

D. Clean Up of Dust

E. Joint Filling

F. Time of Filling

G. No Backer Rod Allowed in Control Joints

4.10 Curing and Protection

A. Dissipating/Removable Curing Compound

1. Application / Removal Method

B. Protection methods

1. Immediately after curing
2. On what areas?
3. Length of protection time

C. Parties receiving reports

END OF SECTION 03 30 00

SECTION 04 20 00 - UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Concrete masonry units (CMU's).
2. Face brick.

B. Related Sections:

1. Section 05 50 00 "Metal Fabrications" for furnishing steel lintels and shelf angles for unit masonry.
2. Section 07 62 00 "Sheet Metal Flashing and Trim" for furnishing manufactured reglets installed in masonry joints.

1.2 ACTION SUBMITTALS

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

B. Shop Drawings: For reinforcing steel. Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement." Show elevations of reinforced walls.

1.3 INFORMATIONAL SUBMITTALS

A. Material Certificates: For each type and size of product indicated. For masonry units include data on material properties.

1.4 QUALITY ASSURANCE

A. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.

1.5 PROJECT CONDITIONS

A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 MASONRY UNITS, GENERAL

A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.

2.2 CONCRETE MASONRY UNITS

A. Shapes: Provide shapes indicated and for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.

B. CMUs: ASTM C 90.

1. Density Classification: Lightweight

C. Concrete Building Brick: ASTM C 55.

1. Density Classification: Lightweight.

D. Decorative CMUs: ASTM C 90.

2.3 CONCRETE AND MASONRY LINTELS

A. General: Provide one of the following:

B. Concrete Lintels: ASTM C 1623, matching CMUs in color, texture, and density classification; and with reinforcing bars indicated. Provide lintels with net-area compressive strength not less than CMUs.

2.4 BRICK

A. General: Provide shapes indicated and as follows:

1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
2. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.

B. Face Brick: Facing brick complying with ASTM C 216.

1. Products: Subject to compliance with requirements, provide the manufacturer and color as indicated on the drawings.
2. Grade: MW or SW.
3. Type: FBS.
4. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
5. Size (Actual Dimensions): **3-5/8 inches** wide by **2-1/4 inches** high by **7-5/8 inches** long.

C. Building (Common) Brick: ASTM C 62, Grade SW.

1. Size: Match size of face brick.

2.5 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

B. Hydrated Lime: ASTM C 207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

D. Masonry Cement: ASTM C 91.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Capital Materials Corporation; Flamingo Color Masonry Cement.
b. Cemex S.A.B. de C.V.; Brikset Type N Kosmortar Type N. (Type S where applicable)
c. Essroc, Italcementi Group; Brixment.
d. Holcim (US) Inc.; Mortamix Masonry Cement].
e. Lafarge North America Inc.; Magnolia Masonry Cement Lafarge Masonry Cement.
f. Lehigh Cement Company; Lehigh Masonry Cement.

E. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C 979. Use only pigments with a record of satisfactory performance in masonry mortar.

F. Colored Cement Product: Packaged blend made from portland cement and hydrated lime or masonry cement and mortar pigments, all complying with specified requirements, and containing no other ingredients.

1. Colored Portland Cement-Lime Mix:
2. Colored Masonry Cement:

G. 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.

H. Aggregate for Grout: ASTM C 404.

I. Epoxy Pointing Mortar: ASTM C 395, epoxy-resin-based material formulated for use as pointing mortar for structural-clay tile facing 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.

J. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Euclid Chemical Company (The); Accelguard 80.

K. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs containing integral water repellent by same manufacturer.

1. Products: Subject to compliance with requirements:

a. ACM Chemistries; RainBloc for Mortar.
b. BASF Aktiengesellschaft; Rheopel Mortar Admixture.
c. Grace Construction Products, W. R. Grace & Co. - Conn.; Dry-Block Mortar Admixture.

L. Water: Potable.

2.6 REINFORCEMENT

A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60.

B. Masonry Joint Reinforcement, General: ASTM A 951/A 951M.

1. Interior Walls: Mill- galvanized, carbon steel.
2. Exterior Walls: Hot-dip galvanized, carbon steel.
3. Wire Size for Side Rods: 0.148-inch diameter.
4. Wire Size for Cross Rods: 0.148-inch diameter.
5. Wire Size for Veneer Ties: 0.148-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.

C. Masonry Joint Reinforcement for Single-Wythe Masonry: Either ladder or truss type with single pair of side rods.

D. Masonry Joint Reinforcement for Multiwythe Masonry:

1. Ladder type with 1 side rod at each face shell of hollow masonry units more than 4 inches wide, plus 1 side rod at each wythe of masonry 4 inches wide or less.
2. Tab type, either ladder or truss design, with 1 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, either ladder or truss 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 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.

E. Masonry Joint Reinforcement for Veneers Anchored with Seismic Masonry-Veneer Anchors: Single 0.187-inch- diameter, hot-dip galvanized, carbon-steel continuous wire.

2.7 TIES AND ANCHORS

A. 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.

B. Wire Ties, General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least 5/8-inch cover on outside face. Outer ends of wires are bent 90 degrees and extend 2 inches parallel to face of veneer.

C. 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.

D. 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, sized to extend within 1 inch of masonry face, made from 0.187-inch- diameter, hot-dip galvanized steel wire.

E. 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.
2. Tie Section: Triangular-shaped wire tie, sized to extend within 1 inch of masonry face, made from 0.187-inch- diameter, hot-dip galvanized steel wire.

F. Partition Top anchors: 0.105-inch- thick metal plate with 3/8-inch- diameter metal rod 6 inches long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from steel, hot-dip galvanized after fabrication.

G. Rigid Anchors: Fabricate from steel bars 1-1/2 inches wide by 1/4 inch thick by 24 inches long, with ends turned up 2 inches or with cross pins unless otherwise indicated.

1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A 153/A 153M.

H. Adjustable Masonry-Veneer Anchors:

1. General: Provide anchors that allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to wood or metal studs, and as follows:

a. Structural Performance Characteristics: Capable of withstanding a 100-lbf load in both tension and compression without deforming or developing play in excess of 0.05 inch.

2. Wire Ties: Triangular-, rectangular-, or T-shaped wire ties fabricated from 0.187-inch- diameter, hot-dip galvanized steel wire.
3. Contractor's Option: Unless otherwise indicated, provide any of the following types of anchors:
4. Screw-Attached, Masonry-Veneer Anchors: Units consisting of a wire tie and a metal anchor section.

a. Anchor Section: Rib-stiffened, sheet metal plate with screw holes top and bottom, having slotted holes for inserting wire tie.

5. Seismic Masonry-Veneer Anchors: Units consisting of a metal anchor section and a connector section designed to engage a continuous wire embedded in the veneer mortar joint.

a. Anchor Section: Rib-stiffened, sheet metal plate with screw holes top and bottom, having slotted holes for inserting connector section.

b. Connector Section: Rib-stiffened, sheet metal bent plate, sheet metal clip, or wire tie and rigid PVC extrusion designed to engage continuous wire. Size connector to extend at least halfway through veneer but with at least 5/8-inch cover on outside face.
c. Fabricate wire connector sections from 0.187-inch- diameter, hot-dip galvanized, carbon-steel wire.

I. Anchor Bolts: Headed or L-shaped steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153/A 153M, Class C; of dimensions indicated.

2.8 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing complying with Section 07 62 00 "Sheet Metal Flashing and Trim" and as follows:

1. Metal Drip Edge: Fabricate from stainless steel. Extend at least 3 inches into wall and 1/2 inch out from wall, with outer edge bent down 30 degrees and hemmed.
2. Metal Sealant Stop: Fabricate from stainless steel. Extend at least 3 inches into wall and out to exterior face of wall. At exterior face of wall, bend metal back on itself for 3/4 inch and down into joint 1/4 inch to form a stop for retaining sealant backer rod.
3. Metal Expansion-Joint Strips: Fabricate from stainless steel to shapes indicated.

B. Flexible Flashing: Use one of the following unless otherwise indicated:

1. Copper-Laminated Flashing: 5-oz./sq. ft. copper sheet bonded between 2 layers of glass-fiber cloth. Use only where flashing is fully concealed in masonry.
2. Rubberized-Asphalt Flashing: Composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.030 inch.
3. Elastomeric Thermoplastic Flashing: Composite flashing product consisting of a polyester-reinforced ethylene interpolymer alloy.
4. EPDM Flashing: Sheet flashing product made from ethylene-propylene-diene terpolymer, complying with ASTM D 4637, 0.040 inch thick.

C. Solder and Sealants for Sheet Metal Flashings:[As specified in Section 07 62 00 "Sheet Metal Flashing and Trim."]

D. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.9 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; formulated from neoprene urethane or PVC.

B. Preformed Control-Joint Gaskets: Made from [styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805] [or] [PVC, complying with ASTM D 2287, Type PVC-65406] and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

D. Weep/Vent Products: Use one of the following unless otherwise indicated:

1. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch less than depth of outer wythe, in color selected from manufacturer's standard. #85 cell vent by Heckman Building Products, Inc.

E. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.

2.10 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

2.11 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.
2. Use portland cement-lime or masonry cement mortar unless otherwise indicated.
3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. 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, Proportion or 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.
4. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.
5. For interior non-load-bearing partitions, Type O may be used instead of Type N.

D. Pigmented Mortar: Use colored cement product, Do not add pigments to colored cement products.

1. Pigments shall not exceed 10 percent of portland cement by weight.
2. Pigments shall not exceed 5 percent of masonry cement by weight.
3. Application: Use pigmented mortar for exposed mortar joints with the following units:

a. Decorative CMUs.
b. Face brick.

E. Grout for Unit Masonry: Comply with ASTM C 476.

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.

C. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

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.

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. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

3.4 MORTAR BEDDING AND JOINTING

A. Lay hollow CMUs as follows:

1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
4. With entire units, including areas under cells, fully bedded in mortar 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 COMPOSITE MASONRY

A. Bond wythes of composite masonry together using one of the following methods:

1. Individual Metal Ties: Provide ties as shown installed in horizontal joints, but not less than one metal tie for 2.67 sq. ft. of wall area spaced not to exceed 24 inches o.c. horizontally and 16 inches o.c. vertically. Stagger ties in alternate courses. Provide additional ties within 12 inches of openings and space not more than 36 inches apart around perimeter of openings. At intersecting and abutting walls, provide ties at no more than 24 inches o.c. vertically.
2. Masonry Joint Reinforcement: Installed in horizontal mortar joints.

    a. Where bed joints of both wythes align, use ladder-type reinforcement extending across both wythes.
    b. Where bed joints of wythes do not align, use adjustable (two-piece) type reinforcement with continuous horizontal wire in facing wythe attached to ties.

B. Corners: Provide interlocking masonry unit bond in each wythe and course at corners unless otherwise indicated.

C. Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, bond walls together as follows:

1. Provide continuity with masonry joint reinforcement by using prefabricated T-shaped units.

3.6 CAVITY WALLS

A. Bond wythes of cavity walls together using one of the following methods:

1. Individual Metal Ties: Provide ties as shown installed in horizontal joints, but not less than one metal tie for 2.67 sq. ft. of wall area spaced not to exceed 24 inches o.c. horizontally and 16 inches o.c. vertically. Stagger ties in alternate courses. Provide additional ties within 12 inches of openings and space not more than 36 inches apart around perimeter of openings. At intersecting and abutting walls, provide ties at no more than 24 inches o.c. vertically.
2. Masonry Joint Reinforcement: Installed in horizontal mortar joints.

    a. Where bed joints of both wythes align, use ladder-type reinforcement extending across both wythes.
    b. Where bed joints of wythes do not align, use adjustable (two-piece) type reinforcement with continuous horizontal wire in facing wythe attached to ties.
    c. Where one wythe is of clay masonry and the other of concrete masonry, use adjustable (two-piece) type reinforcement with continuous horizontal wire in facing wythe attached to ties to allow for differential movement regardless of whether bed joints align.

B. Keep cavities clean of mortar droppings and other materials during construction. Bevel beds away from cavity, to minimize mortar protrusions into cavity. Do not attempt to trowel or remove mortar fins protruding into cavity.

C. Coat cavity face of backup wythe to comply with Section 07 11 13 "Bituminous Damp Proofing."

D. Apply air barrier to face of backup wythe to comply with Section 07 27 26 "Fluid-Applied Membrane Air Barriers."

E. Installing Cavity-Wall Insulation: Place small dabs of adhesive, spaced approximately 12 inches o.c. both ways, on inside face of insulation boards, or attach with plastic fasteners designed for this purpose. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.

3.7 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.

B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

3.8 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 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.

3.9 ANCHORING MASONRY VENEERS

A. Anchor masonry veneers to wall framing and concrete and masonry backup with masonry-veneer anchors to comply with the following requirements:

1. Fasten screw-attached and seismic anchors through sheathing to wall framing and to concrete and masonry backup with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener.
2. Embed connector sections and continuous wire in masonry joints. Provide not less than 2 inches of air space between back of masonry veneer and face of sheathing.
3. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
4. Space anchors as indicated, but not more than 16 inches o.c. vertically and 24 inches o.c. horizontally with not less than 1 anchor for each 2.67 sq. ft. of wall area. Install additional anchors within 12 inches of openings and at intervals, not exceeding 36 inches, around perimeter.

3.10 FLASHING, WEEP HOLES, CAVITY DRAINAGE, AND VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated. Install vents at shelf angles, ledges, and other obstructions to upward flow of air in cavities, and where indicated.

B. Install flashing as follows unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.

2. At lintels and shelf angles, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.
3. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal drip edge.
4. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal flashing termination.

C. Install weep holes in head joints in exterior wythes of first course of masonry immediately above embedded flashing and as follows:

1. Use specified weep/vent products or open head joints to form weep holes.
2. Space weep holes 24 inches o.c. unless otherwise indicated.
3. Cover cavity side of weep holes with plastic insect screening at cavities insulated with loose-fill insulation.

D. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in "Miscellaneous Masonry Accessories" Article.

3.11 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 tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

B. Inspections: Level 1 special inspections according to the "International Building Code."

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 Prior to Construction: One set of tests.

D. Clay Masonry Unit Test: For each type of unit provided, according to ASTM C 67 for compressive strength.

E. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.

F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.

G. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for mortar air content and compressive strength.

H. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

3.12 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. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes.
2. Protect surfaces from contact with cleaner.
3. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
4. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
5. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

END OF SECTION 04 20 00

SECTION 05 12 00 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Structural steel.
2. Grout.

B. Related Requirements:

1. Section 05 12 13 "Architecturally Exposed Structural Steel" 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, fabricator, and testing agency.

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.

1.6 QUALITY ASSURANCE

A. Fabricator Qualifications: Engage a firm experienced in fabricating structural steel similar to that indicated for this Project and with a record of successful in-service performance, as well as a sufficient production capacity to fabricate structural steel

without delaying the work. The fabricator shall provide evidence in writing of one of the following:

1. A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.
2. The fabrictator shall demonstrate a consistent record of at least 10 successful projects of equal or greater magnitude over the preceding 2 years.

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 AISC 360 or schematic details indicated on drawings, whichever is more strict.

2.2 STRUCTURAL-STEEL MATERIALS

A. W-Shapes: ASTM A 992/A 992M.

B. Angles, C-Shapes, MC-Shapes, S-Shapes, M-Shapes: ASTM A 36/A 36M.

C. Plate and Bar: ASTM A 36/A 36M and ASTM A 572/A 572M, Grade 50.

D. Cold-Formed HSS-Rectangular: ASTM A 500/A 500M, Grade B.

E. Cold-Formed HSS-Round: ASTM A 500/A500M, Grade C.

F. Hot-Formed Structural Steel Tubing: ASTM A 501.

G. Steel Pipe: ASTM A 53/A 53M, Type E or Type S, Grade B.

H. Welding Electrodes: Comply with AWS requirements.

2.3 BOLTS, CONNECTORS, AND ANCHORS

A. Common Bolts: ASTM A307, Grade A; carbon-steel, hex-head bolts; and carbon-steel nuts.

B. 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.

1. Direct-Tension Indicators: ASTM F 959, Type 325, compressible-washer type with plain finish.

C. 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 or mechanically deposited zinc coating.
2. Direct-Tension Indicators: ASTM F 959, Type 325, compressible-washer type with mechanically deposited zinc coating finish.

D. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.

E. Unheaded Anchor Rods: ASTM F 1554, Grade 55, with weldability supplement S1.

1. Configuration: Threaded & Double Nutted with washer, snug-tight at embedded end.
2. Finish: Plain

F. Headed Anchor Rods: ASTM F 1554, Grade 55, with weldability supplement S1.

1. Finish: Plain.

G. Threaded Rods: ASTM A 36/A 36M.

1. Finish: Plain or Hot-dip zinc coating, ASTM A 153/A 153M, Class C (as indicated).

H. Clevises and Turnbuckles: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1035.

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. 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.

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. Fabricate architecturally exposed structural steel with exposed surfaces smooth, square, and free of surface blemishes, including pitting, rust and scale seam marks, roller marks, rolled trade names, and roughness.

1. Remove blemishes by filling, grinding, or by welding and grinding, prior to cleaning, treating, and shop priming.

C. Comply with fabrication requirements, including tolerance limits, of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for architecturally exposed structural steel

D. 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 unless indicated on structural drawings.

B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M 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. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).

5. Galvanized surfaces.
6. Surfaces enclosed in interior construction.

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."
2. SSPC-SP 3, "Power Tool Cleaning."
3. SSPC-SP 7/NACE No. 4, "Brush-off Blast 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 indicated for galvanizing according to ASTM A 123.

2.10 SOURCE QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform shop tests and inspections.

1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

B. Bolted Connections: Inspect and test shop-bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

C. Welded Connections: Visually inspect shop-welded connections according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:

1. Liquid Penetrant Inspection: ASTM E 165.
2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
3. Ultrasonic Inspection: ASTM E 164.
4. Radiographic Inspection: ASTM E 94.

D. Prepare test and inspection reports.

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 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.
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. Remove erection bolts on welded, architecturally exposed structural steel; fill holes with plug welds; and grind smooth at exposed surfaces.

E. Do not use thermal cutting during erection.

F. Finish sections thermally cut during erection equal to a sheared appearance.

G. Sort out not enlarge unfair holes in members by burning or by using drift pins. Ream holes that must be enlarged to admit bolts.

3.3 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 or as indicated on structural drawings.

B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M 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, 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.

3.4 FIELD QUALITY CONTROL

A. Special Inspections: Engage a qualified special inspector to perform the following special inspections:

1. Verify structural-steel materials and inspect steel frame joint details.
2. Verify weld materials and inspect welds.
3. Verify connection materials and inspect high-strength bolted connections.

B. Testing Agency; Engage a qualified testing agency to perform tests and inspections.

C. Bolted Connections: Inspect and test bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

D. Welded Connections: Visually inspect field welds according to AWS D1.1/D1.1M.

1. In addition to visual inspection, test and inspect field welds according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:

a. Liquid Penetrant Inspection: ASTM E 165.
b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
c. Ultrasonic Inspection: ASTM E 164.
d. Radiographic Inspection: ASTM E 94.

END OF SECTION 05 12 00

SECTION 05 12 13 – ARCHITECTURALLY EXPOSED STRUCTURAL STEEL

PART 1 - GENERAL

1.1 SUMMARY

A. This section includes the requirements regarding the appearance and surface preparation of Architecturally Exposed Structural Steel (AESS).

1. This section applies to any members noted on Architectural and Structural drawings as
2. Requirements in Division 05 Section “Structural Steel Framing” also apply to AESS framing.

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

1.2 DEFINITIONS

A. Architecturally Exposed Structural Steel: Structural steel designated as “architecturally exposed structural steel” or “AESS” in the Contract Documents.

1.3 ACTION SUBMITTALS

A. Shop Drawing: 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. Provide erection drawings clearly indicating which members are considered as AESS members.
2. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
3. Include embedment drawings.
4. 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.
5. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections. Indicate orientation of bolt heads.
6. Indicate exposed surfaces and edges and surface preparation being used.
7. Indicate special tolerances and erection requirements, as noted on drawings or defined herein.

B. Samples:

1. Submit samples of AESS to set quality standards for welds for Category 1 AESS.

a. Steel plate, 3/8”x8”x8”, with one end of a short length of round steel tube, 6”, welded to plate with a continuous fillet weld and with weld ground smooth and blended.

2. Submit samples for AESS 3, Cruciform columns.

a. 4’-0” length of custom Cruciform columns, including the baseplate and bolting pattern on sample.

1.4 QUALITY ASSURANCE

A. Erector Qualifications: In addition to those qualifications listed in Division 05 Section “Structural Steel Framing”, engage an experienced Erector who has completed AESS work similar in material, design and extent to that indicated for this Project and with a record of successful in-service performances.

B. Fabricator Qualifications: In addition to those qualifications listed in Division 05 Section “Structural Steel Framing”, engage a firm experienced in fabricating AESS similar to that indicated for this Project with a record of successful in-service performance, as well as sufficient production capacity to fabricate AESS without delaying the Work.

C. Mockups: Build mockups of AESS to set quality standards for fabrication and installation.

1. Build mockup of typical portion of AESS as shown on Drawings.
2. Coordinate finish painting requirements with division 09 “Painting”
3. Approved mockups may become part of the completed work if undisturbed at time of substantial completion.

1.5 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.

B. Erect pre-painted finish pieces using padded slings or other methods such that they are not damaged. Provide padding as required to protect while rigging and aligning member's frames. Weld tabs for temporary bracing and safety cabling only at points concealed from view in the completed structure or where approved by the Architect during the pre-installation meeting. Architect must approve methods of removing temporary erection devices and finishing the AESS members prior to erection.

1.6 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

1.7 PROJECT 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 MATERIALS

A. General: Meet requirements of Division 05 Section "Structural Steel Framing" as amended below.

2.2 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.

2.3 PRIMER

A. Primer: Comply with division 09, "Painting".

B. Finish Paint: Provide first finish coat of paint in shop. Refer to Painting Specification.

2.4 FABRICATION

A. Shop fabricate and assemble AESS to the maximum extent possible. Locate field hoists at concealed locations if possible. Detail AESS assemblies to minimize field handling and expedite erection.

B. In addition to special care used to handle and fabricate AESS, comply with the following.

1. Fabricate with exposed surfaces smooth, square, and fee of surface blemishes including pitting, rust, scale, and roughness, consistent with the approved mockup.
2. Grind sheared, punched, and flame-cut edges of AESS to remove burrs and provide smooth surfaces and edges.
3. Fabricate AESS with exposed surfaces free of mill marks, including rolled trade names and stamped or raised identifications.
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 designated AESS.
8. Seal-weld open ends of hollow structural sections with 3/8 inch closure plates for AESS.

C. Coping, Blocking, and Joint Gaps: Maintain uniform gaps of 1/8 inch with a tolerance of 1/32 inch for AESS.

D. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.

E. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel framing members.

1. Cut, drill, or punch 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.

1. Joint Type: snug tightened

B. Weld Connections: Comply with AWS D1.1 and AWS D18 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 0 inch for AESS.
6. Make butt and groove welds flush to adjacent surfaces within tolerance of plus 1/16 inch, minus 0 inch for AESS. 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 for AESS.
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 for AESS of uniform size and profile with exposed face smooth and slightly concave. Do not grind unless directed to correct unacceptable work.

C. Detail connections between AESS members and non-AESS members, masonry, concrete and other supports to be adjustable items to accommodate erection tolerances.

2.6 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 (50 mm).
2. Surfaces to be field welded.
3. Surfaces to be high-strength bolted with slip-critical connections.
4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
5. 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-SP2, “Hand Tool Cleaning.”
2. SSPC-SP3, “Power Tool Cleaning.”
3. SSPC-SP7/NACE No. 4, “Brush off Blast Cleaning.”

4. SSPC-SP6/NACE No. 3, “Commercial Blast Cleaning.”

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. Examine AESS for twists, kinks, warping, gouges, and other imperfections before erecting. Coordinate remedial action with fabricator prior to erecting AESS.

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.

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. Handle, lift and align pieces using padded slings and /or other protection required to maintain the appearance of AESS.

1. Erect AESS to the tolerances specified in AISC 303 for steel that is designated AESS.

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 for AESS.
2. Remove erection bolts in AESS, fill holes, and grind smooth.
3. Fill weld access holes in AESS and grind smooth.

C. Detail connections between AESS members and non-AESS members, masonry, concrete and other supports as adjustable items to accommodate erection tolerances.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.

B. Architect will observe AESS in place to determine acceptability relating to aesthetic effect based on the mockup.

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. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same materials used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Clean and prepare surfaces by SSPC-SP 62hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

C. Touchup Painting: Cleaning and touchup painting are specified in Division 09 painting Sections.

END OF SECTION 05 12 13

SECTION 052100 - STEEL JOIST FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. K-series steel joists.
2. K-series steel joist substitutes.
3. LH- and DLH-series long-span steel joists.
4. Joist girders.
5. Joist accessories.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of joist, accessory, and product.

1. Product Data to be submitted to the owner after architectural approval

B. Shop Drawings Submit to architect:

1. Include layout, designation, number, type, location, and spacing of joists.
2. Include joining and anchorage details, bracing, bridging, and joist accessories; splice and connection locations and details; and attachments to other construction.

1.3 INFORMATIONAL SUBMITTALS – all submittals to architect

A. Welding certificates.

B. Manufacturer certificates.

C. Mill Certificates: For each type of bolt.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer certified by SJI to manufacture joists complying with applicable standard specifications and load tables in SJI's "Specifications."

1. Manufacturer's responsibilities include providing professional engineering services for designing special joists to comply with performance requirements.

B. SJI Specifications: Comply with SJI's "Standard Specifications Load Tables and Weight Tables for Steel Joists and Joist Girders" (hereafter, "Specifications"), applicable to types of joists indicated.

C. Welding Qualifications: Qualify field-welding procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle joists as recommended in SJI's "Specifications."

B. All metal decking shall be delivered in good condition, and shall be stored in a neat and orderly manner. If necessary, material shall be elevated to protect it from water and mud. Material shall be stored adjacent to the work as directed by the architect/engineer.

PART 2 - PRODUCTS

2.1 K-SERIES STEEL JOISTS

A. Manufacture steel joists of type indicated according to "Standard Specifications for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle top- and bottom-chord members, underslung ends, and parallel top chord.

B. Steel Joist Substitutes: Manufacture according to "Standard Specifications for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle or -channel members.

2.2 LONG-SPAN STEEL JOISTS

A. Manufacture steel joists according to "Standard Specifications 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 JOIST GIRDERS

A. Manufacture joist girders according to "Standard Specifications for Joist Girders" in SJI's "Specifications," with steel-angle top- and bottom-chord members; with end and top-chord arrangements as indicated.

2.4 PRIMERS

A. Primer: Manufacturer’s standard lead and chromate-free, nonasphaltic, rust-inhibiting primer.

2.5 JOIST ACCESSORIES

A. Bridging: Provide bridging anchors and number of rows of diagonal bridging of material, size, and type as indicated in the construction drawings but not less than that required by SJI's "Specifications" for type of joist, chord size, spacing, and span. Furnish additional erection bridging if required for stability.

B. Bridging: Schematically indicated. Detail and fabricate according to SJI's "Specifications." Furnish additional erection bridging if required for stability.

C. Furnish ceiling extensions, either extended bottom-chord elements or a separate extension unit of enough strength to support ceiling construction. Extend ends to within 1/2 inch of finished wall surface unless otherwise indicated.

D. Carbon-Steel Bolts and Threaded Fasteners: ASTM A 307, Grade A, carbon-steel, hex-head bolts and threaded fasteners; carbon-steel nuts; and flat, unhardened steel washers.

1. Finish: Plain, uncoated.

E. 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.

F. Furnish miscellaneous accessories including splice plates and bolts required by joist manufacturer to complete joist assembly.

2.6 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.

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 recommendations, 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 bearing plates and 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. Bolt joists to supporting steel framework using high-strength structural bolts. Comply with Research Council on Structural Connection's "Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts" for high-strength structural bolt installation and tightening requirements.

F. 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 walls or beams.

3.2 FIELD QUALITY CONTROL

A. Testing Agency: Unless otherwise required by contractual special provisions, the GC shall engage a qualified independent testing and inspecting agency to inspect field welds and bolted connections and to perform field tests and inspections and prepare test and inspection reports

3.3 PROTECTION

A. 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.

B. B.Repair Painting: Wire brush and clean rust spots, welds, and abraded areas of prime-painted deck immediately after installation, and apply repair paint.

END OF SECTION 05 21 00

SECTION 05 31 00 - STEEL DECKING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Roof deck.
2. Noncomposite form deck.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of deck, accessory, and product indicated.

B. Shop Drawings – Submit to architect:

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.

C. Evaluation reports.

D. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed steel deck similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

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

C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

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. 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. Prime-Painted Steel Sheet: ASTM A 1008/A 1008M, Structural Steel (SS), Grade 33 minimum, shop primed with manufacturer's standard baked-on, rust-inhibitive primer.

    a. Color: Manufacturer's standard gray

2. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33 G60 zinc coating at exterior applications only.
3. Deck Profile: As indicated
4. Profile Depth: 1 ½” unless indicated otherwise on drawings.
5. Design Uncoated-Steel Thickness: 22 GA, (.0299 in.)

2.3 NONCOMPOSITE FORM DECK

A. Noncomposite Form Deck: Fabricate ribbed-steel-sheet noncomposite form-deck panels to comply with "SDI Specifications and Commentary for Noncomposite Steel Form Deck," in SDI Publication No. 31, with the minimum section properties indicated, and with the following:

1. Prime-Painted Steel Sheet: ASTM A 1008/A 1008M, Structural Steel (SS), Grade 33 minimum, with top and underside surface shop primed with manufacturer's standard baked-on, rust-inhibitive primer.

    a. Color: Manufacturer's standard Gray.

2. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33. G60 zinc coating at exterior applications only.
3. Profile Depth: 1 ½” or as indicated on the drawings.
4. Design Uncoated-Steel Thickness: 22 ga. (.0299 in.) or as indicated on the drawings.

2.4 ACCESSORIES

A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.

B. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.

C. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.

D. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 20 gauge (0.0359-inch) design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.

E. Flat Sump Plates: Single-piece steel sheet, 14 gauge (0.0747 inch) thick, of same material and finish as deck. For drains, cut holes in the field.

F. Galvanizing Repair Paint: ASTM A 780.

G. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

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 on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.

C. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

D. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.

E. Provide additional reinforcement and closure pieces at openings larger than 12” for strength, continuity of deck, and support of other work.

F. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

G. Mechanical fasteners may <u>not</u> be used in lieu of welding to fasten deck.

H. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and weld flanges to top of deck. Space welds not more than 12 inches apart with at least one weld at each corner.

1. Install reinforcing channels or zees in ribs to span between supports and weld.

I. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld to substrate to provide a complete deck installation.

1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.

J. Pour Stops and Girder Fillers: Weld steel-sheet pour stops and girder fillers to supporting structure according to SDI recommendations unless otherwise indicated.

K. 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. Testing Agency: Unless otherwise required by contractual special provisions, the GC shall engage a qualified testing agency to perform tests and inspections.

B. Field welds will be subject to inspection.

C. Testing agency will report inspection results promptly and in writing to Contractor Architect and Owner/tenant Construction Representative.

D. Remove and replace work that does not comply with specified requirements.

E. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

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.

B. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation, and apply repair paint.

END OF SECTION 05 31 00

SECTION 05 40 00 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Load-bearing wall framing.
2. Exterior non-load-bearing wall framing.

1.2 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Welding certificates.

C. Product test reports.

D. Research reports.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed cold-formed metal framing similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Engineering Responsibility: Engage a qualified professional engineer registered in the state of the project, to prepare design calculations, Shop Drawings, and other structural data.

C. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of cold-formed metal framing that are similar to those indicated for this Project in material, design, and extent.

D. Product Tests: Mill certificates or data from a qualified independent testing agency.

E. AISI Specifications: Comply with AISI's NASPEC-2001 "North American Specification for the Design of Cold-Formed Steel Structural Members" for calculating structural characteristics of cold-formed metal framing:

1. CCFSS Technical Bulletin: "AISI Specification Provisions for Screw Connections."

F. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

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. Dietrich Metal Framing; a Worthington Industries company.
2. MarinoWARE.
3. Nuconsteel; a Nucor Company.

2.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide cold-formed metal framing capable of withstanding design loads within limits and under conditions indicated.

1. Design Loads: As indicated.
2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:

    a. Exterior Non-Load-Bearing Curtain-Wall Framing: Horizontal deflection of 1/600 of the wall height at brick veneer and 1/360 for other veneers but not greater than the veneer manufacturer's recommended maximum deflection.

3. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.
4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:

    a. Upward movement of 1 inch and downward movement of 1” (total movement of 2 inches).

B. Design exterior non-load-bearing curtain-wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials

C. AISI Specifications and Standards: Unless more stringent requirements are indicated, comply with AISI S100 and AISI S200.

D. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency.

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

2.3 COLD-FORMED STEEL FRAMING, GENERAL

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:

1. Grade: 33 for 20 gage (33 mil) and 18 gage (43 mil) members, 50 for 16 gage (54 mil), 14 gage (68 mil), and 12 gage (97 mil) members.
2. Coating: G60 minimum.

C. Steel Sheet for Clips: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:

1. Thickness: 16 gage (54 mil) minimum
2. Grade: 50
3. Coating: G60.

2.4 LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0329 inch (20 gage structural, 33 mils).
2. Flange Width: 1-5/8 inches minimum.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with straight flanges, and matching minimum base-metal thickness of steel studs.

C. Steel Box or Back-to-Back Headers: Manufacturer's standard C-shapes used to form header beams, of web depths indicated, unpunched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0329 inch (20 gage structural, 33 mils).
2. Flange Width: 1-5/8 inches minimum.

2.5 EXTERIOR NON-LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0329 inch (20 gage structural, 33 mils).
2. Flange Width: 1-5/8 inches minimum.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and matching minimum base-metal thickness of steel studs.

C. Vertical Deflection Clips: Manufacturer's standard bypass or head clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.

D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure.

E. Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.

F. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure through positive mechanical attachment to stud web and structure.

2.6 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.

B. Provide accessories of manufacturer's standard thickness and configuration.

2.7 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.

B. Vertical Deflection Clips: Manufacturer's standard bypass clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.

C. Anchor Bolts: ASTM F 1554 Grade 36 or A36, threaded carbon-steel] and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.

D. Expansion Anchors: Fabricated from corrosion-resistant materials, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing per ASTM E 488 conducted by a qualified testing agency.

E. 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.

F. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.

1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

2.8 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: ASTM A 780.

PART 3 - EXECUTION

3.1 PREPARATION

A. Install load bearing shims or grout between the underside of load-bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/4 inch to ensure a uniform bearing surface on supporting concrete or masonry construction.

B. Install sealer gaskets at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

3.2 INSTALLATION, GENERAL

A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.

B. Install cold-formed steel framing according to AISI S200 and to manufacturer's written instructions unless more stringent requirements are indicated.

C. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.

D. Install framing members in one-piece lengths.

E. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

F. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.

G. Install insulation, specified in Section 07 21 00 "Thermal Insulation," in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.

H. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.

I. Erection Tolerances: Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.3 LOAD-BEARING WALL INSTALLATION

A. Install continuous top and bottom tracks with thickness to match studs. Align tracks accurately and securely anchor at corners and ends, and at spacings as follows:

1. Anchor Spacing: As Indicated.

B. Squarely seat studs against top and bottom tracks with gap not exceeding of 1/8 inch between the end of wall framing member and the web of track. Fasten both flanges of studs to top and bottom tracks. Space studs as follows:

1. Stud Spacing: As indicated but not to exceed 16" oc.

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar configurations.

D. Align studs vertically where floor framing interrupts wall-framing continuity. Where studs cannot be aligned, continuously reinforce track to transfer loads.

E. Align floor and roof framing over studs. Where framing cannot be aligned, continuously reinforce track to transfer loads.

F. Anchor studs abutting structural columns or walls, including masonry walls, to supporting structure as indicated.

G. Install headers over wall openings wider than stud spacing. Locate headers above openings as indicated. Fabricate headers of compound shapes indicated or required to transfer load to supporting studs, complete with clip-angle connectors, web stiffeners, or gusset plates.

1. Frame wall openings with not less than a double stud at each jamb of frame as indicated on Shop Drawings. Fasten jamb members together to uniformly distribute loads.
2. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with clip angles or by welding, and space jack studs same as full-height wall studs.

H. Install supplementary framing, blocking, and bracing in stud framing indicated to support fixtures, equipment, services, casework, heavy trim, furnishings, and similar work requiring attachment to framing.

1. If type of supplementary support is not indicated, comply with stud manufacturer's written recommendations and industry standards in each case, considering weight or load resulting from item supported.

I. Install horizontal bridging in stud system, spaced vertically as indicated but not to exceed 48 inches. Fasten at each stud intersection.

1. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs with a minimum of two screws into each flange of the clip angle for framing members up to 6 inches deep.
2. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
3. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

J. Install steel sheet diagonal bracing straps to both stud flanges, terminate at and fasten to reinforced top and bottom tracks. Fasten clip-angle connectors to multiple studs at ends of bracing and anchor to structure.

K. Install miscellaneous framing and connections, including supplementary framing, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.4 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.

B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:

1. Stud Spacing: As indicated but not to exceed 16"oc.

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.

D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.

1. Install single deep-leg deflection tracks and anchor to building structure.
2. Install double deep-leg deflection tracks and anchor outer track to building structure.
3. Connect vertical deflection clips to studs and anchor to building structure.
4. Connect drift clips to cold-formed metal framing and anchor to building structure.

E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.

1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.
2. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
3. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
4. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.5 FIELD QUALITY CONTROL

A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Field and shop welds will be subject to testing and inspecting.

C. Testing agency will report test results promptly and in writing to Contractor and Architect.

D. Remove and replace work where test results indicate that it does not comply with specified requirements.

E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.6 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, which ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 05 40 00

SECTION 05 50 00 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Miscellaneous steel framing and supports.
2. Shelf angles.
3. Metal ladders.
4. Ladder safety cages.
5. Structural-steel door frames.
6. Miscellaneous steel trim.
7. Metal bollards.
8. Pipe Downspout guards.
9. Loose bearing and leveling plates.

B. Products furnished, but not installed, under this Section include the following:

1. Loose steel lintels.
2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
3. Steel weld plates and angles for casting into concrete for applications where they are not specified in other Sections.

1.2 ACTION SUBMITTALS

A. Product Data: For the following:

1. Paint products.
2. 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. 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. Steel Tubing: ASTM A 500/A 500M, cold-formed steel tubing.

E. Steel Pipe: ASTM A 53/A 53M, Standard Weight (Schedule 40) unless otherwise indicated.

F. Zinc-Coated Steel Wire Rope: ASTM A 741.

1. Wire-Rope Fittings: Hot-dip galvanized-steel connectors with capability to sustain, without failure, a load equal to minimum breaking strength of wire rope with which they are used.

G. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.

1. Size of Channels: As indicated.
2. Material: Galvanized steel, ASTM A 653/A 653M, commercial steel, Type B, with G90 coating; 0.108-inch nominal thickness.

H. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.

I. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.

J. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.

K. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.

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.

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.

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 or chemical 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.

E. Railings: Provide the following:

1. Ungalvanized-Steel Railings: Plated steel fasteners complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5 for zinc coating.

2.4 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Shop Primers: Provide primers that comply with Section 09 91 13 "Painting,"

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 03 30 00 "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.

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.

2.7 SHELF ANGLES

A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive 3/4-inch bolts, spaced not more than 6 inches from ends and 24 inches o.c., unless otherwise indicated.

B. For cavity walls, provide vertical channel brackets to support angles from backup masonry and concrete.

C. Galvanize shelf angles located in exterior walls.

D. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.

2.8 METAL LADDERS

A. General:

1. Comply with ANSI A14.3.

B. Steel Ladders:

1. Space siderails 18 inches apart unless otherwise indicated.
2. Siderails: Continuous, 3/8-by-2-1/2-inch steel flat bars, with eased edges.
3. Rungs: 3/4-inch- diameter steel bars.
4. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
5. Provide nonslip surfaces on top of each rung.
6. Galvanize exterior ladders, including brackets.

2.9 LADDER SAFETY CAGES

A. Fabricate ladder safety cages to comply with ANSI A14.3. Assemble by welding or with stainless-steel fasteners.

B. Provide primary hoops at tops and bottoms of cages and spaced not more than 20 feet o.c. Provide secondary intermediate hoops spaced not more than 48 inches o.c. between primary hoops.

C. Galvanize steel ladder safety cages, including brackets and fasteners.

2.10 STRUCTURAL-STEEL DOOR FRAMES

A. Fabricate structural-steel door frames from steel shapes, plates, and bars of size and to dimensions indicated, fully welded together, with 5/8-by-1-1/2-inch steel channel stops. Plug-weld built-up members and continuously weld exposed joints. Reinforce frames and drill and tap as necessary to accept finish hardware.

1. Provide with integrally welded steel strap anchors for securing door frames into adjoining concrete or masonry.

B. Galvanize exterior steel frames.

2.11 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.

2.12 METAL BOLLARDS

A. Fabricate metal bollards from Schedule 40 steel pipe steel shapes, as indicated.

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.

D. Prime bollards with zinc-rich primer.

2.13 RAILINGS

A. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

B. Form work true to line and level with accurate angles and surfaces.

C. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove flux immediately.
4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.

D. Form changes in direction by bending.

E. For changes in direction made by bending, use jigs to produce uniform curvature for each repetitive configuration required. Maintain cross section of member throughout

entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

F. Close exposed ends of railing members with prefabricated end fittings.

G. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated.

H. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.

2.14 DOWNSPOUT GUARDS

A. Fabricate downspout guards from 3/8-inch- thick by 12-inch- wide steel plate, bent to fit flat against the wall or column at both ends and to fit around pipe with 2-inch clearance between pipe and pipe guard. Drill each end for two 3/4-inch anchor bolts.

B. Galvanize downspout guards.

2.15 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.

2.16 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.

C. Prime loose steel lintels located in exterior walls with zinc-rich primer.

2.17 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.

2.18 FINISHES, GENERAL

A. Finish metal fabrications after assembly.

2.19 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.

C. Preparation for Shop Priming: Prepare surfaces to comply with requirements indicated below:

1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
2. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
3. Items Indicated to Receive Primers Specified in Section 09 96 00 "High-Performance Coatings": SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
4. Other Items: SSPC-SP 3, "Power Tool Cleaning."

D. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3.2 RAILING INSTALLATION

A. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

1. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1. Coat, with a heavy coat of bituminous paint, concealed surfaces of aluminum that are in contact with grout, concrete, masonry, wood, or dissimilar metals.

C. Anchoring posts

1. Form or core-drill holes not less than 5 inches deep and 3/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.

D. Attaching railings

1. Attach railings to wall with wall brackets, except where end flanges are used. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
2. Secure wall brackets and railing end flanges to building construction as follows:
3. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
4. For hollow masonry anchorage, use toggle bolts.
5. For wood stud partitions, use hanger or lag bolts set into studs or wood backing between studs. Coordinate with carpentry work to locate backing members.
6. 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.

3.3 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 place with concrete footings. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.

D. Fill bollards solidly with concrete, mounding top surface to shed water.

3.4 INSTALLING BEARING AND LEVELING PLATES

A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.

B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with nonshrink grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.5 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

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 05 50 00

SECTION 05 52 13 - PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Steel pipe and tube railings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Handrails and Top Rails of Guards:

a. Uniform load of 50 lbf/ ft. applied in any direction.
b. Concentrated load of 200 lbf applied in any direction.
c. Uniform and concentrated loads need not be assumed to act concurrently.

2. Infill of Guards:

a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft..
b. Infill load and other loads need not be assumed to act concurrently.

B. Thermal Movement: 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 surface.

2.2 STEEL AND IRON

A. Tubing: ASTM A 500 (cold formed) or ASTM A 513.

B. Pipe: ASTM A 53/A 53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.

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

2.3 FASTENERS

A. General: Provide the following:

1. Ungalvanized-Steel Railings: Plated steel fasteners complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5 for zinc coating.

2.4 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Etching Cleaner for Galvanized Metal: Complying with MPI#25.

C. Shop Primers: Provide primers that comply with Section 09 91 13 "Exterior Painting" and Section 09 91 23 "Interior Painting."

2.5 FABRICATION

A. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

B. Form work true to line and level with accurate angles and surfaces.

C. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove flux immediately.
4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.

D. Form changes in direction by bending.

E. For changes in direction made by bending, use jigs to produce uniform curvature for each repetitive configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

F. Close exposed ends of railing members with prefabricated end fittings.

G. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated.

H. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.

2.6 STEEL AND IRON FINISHES

A. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

B. Primer Application: Apply shop primer to prepared surfaces of railings unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.

1. Do not apply primer to galvanized surfaces.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

1. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1. Coat, with a heavy coat of bituminous paint, concealed surfaces of aluminum that are in contact with grout, concrete, masonry, wood, or dissimilar metals.

3.2 ANCHORING POSTS

A. Form or core-drill holes not less than 5 inches deep and 3/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.

3.3 ATTACHING RAILINGS

A. Attach railings to wall with wall brackets, except where end flanges are used. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.

B. 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 hollow masonry anchorage, use toggle bolts.
3. For wood stud partitions, use hanger or lag bolts set into studs or wood backing between studs. Coordinate with carpentry work to locate backing members.
4. 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.

3.4 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 requirements 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 05 52 13

SECTION 06 10 53 - MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wood blocking and nailers.
2. Wood furring and grounds.
3. Wood sleepers.
4. Plywood backing panels.

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, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.
3. Provide dressed lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content of Lumber: 15 percent for 2-inch nominal thickness or less, 19 percent for more than 2-inch nominal thickness unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. 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 items indicated on Drawings, and the following:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
4. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 FIRE-RETARDANT-TREATED MATERIALS

A. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
2. Design Value Adjustment Factors: Treated lumber shall be tested according ASTM D 5664, and design value adjustment factors shall be calculated according to ASTM D 6841. For enclosed roof framing, framing in attic spaces, and where high temperature fire-retardant treatment is indicated, provide material with adjustment factors of not less than 0.85 modulus of elasticity and 0.75 for extreme fiber in bending for Project's climatological zone.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent.

C. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.

D. Application: Treat items indicated on Drawings, and the following:

1. Framing for raised platforms.
2. Concealed blocking.
3. Roof framing and blocking.

4. Wood cants, nailers, curbs, equipment support bases, blocking, and similar members in connection with roofing.
5. Plywood backing panels.

2.4 DIMENSION LUMBER FRAMING

A. Other Framing: No. 2 grade and any of the following species: Hem-fir (north); NLGA; Southern pine; SPIB; Douglas fir-larch; WCLIB or WWPA, Mixed southern pine; SPIB; Spruce-pine-fir; NLGA; Spruce-pine-fir; NLGA.Spruce-pine-fir; NLGA.Douglas fir-south; WWPA; Hem-fir; WCLIB or WWPA; Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.

B. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following: Blocking; Nailers; Rooftop equipment bases and support curbs; Cants; Grounds; Utility shelving.

C. For items of dimension lumber size, provide Construction or No. 2 grade lumber of any species.

D. For concealed boards, provide lumber with 19 percent maximum moisture content and any of the following species and grades:

1. Mixed southern pine, No. 2 grade; SPIB.
2. Eastern softwoods, No. 2 Common grade; NELMA.
3. Northern species, No. 2 Common grade; NLGA.
4. Western woods, Construction or No. 2 Common grade; WCLIB or WWPA.

2.5 PLYWOOD BACKING PANELS

A. Equipment Backing Panels: DOC PS 1, Exterior, AC; fire-retardant treated; in thickness indicated or, if not indicated, not less than 3/4-inch nominal thickness.

1. All exterior plywood shall be fabricated with exterior glue.

2.6 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. 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.

B. Power-Driven Fasteners: NES NER-272.

C. Screws for Fastening to Metal Framing: ASTM C 954, length as recommended by screw manufacturer for material being fastened.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other construction; scribe and cope as needed for accurate fit.

B. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

C. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

D. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant treated plywood backing panels with classification marking of testing agency exposed to view.

E. Do not splice structural members between supports unless otherwise indicated.

F. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

G. 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.

H. Provide furring, blocking and backing where required for formation or attachment of architectural features including siding and trim, concealment of pipes, conduits, ducts, building specialties and other fixtures. Consult with the trades concerned; set furring and blocking as required. Additionally, provide wood blocking and plywood as backup for all toilet/bathroom accessories, casework, shelves, handrails, kitchen equipment and other items to be attached to walls.

3.2 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

B. Storage of Materials: Stack framing and other rough lumber to insure proper ventilation and drainage. Cover and otherwise protect from the elements.

END OF SECTION 06 10 53

SECTION 06 16 00 - SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wall sheathing.
2. Roof sheathing.
3. Underlayment.
4. Sheathing joint and penetration treatment.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements.

1.3 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For following products, from ICC-ES:

1. Preservative-treated plywood.
2. Fire-retardant-treated plywood.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For assemblies with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory.".

2.2 WOOD PANEL PRODUCTS

A. Plywood: Either DOC PS 1 or DOC PS 2 unless otherwise indicated.

B. Oriented Strand Board: DOC PS 2.

2.3 PRESERVATIVE-TREATED PLYWOOD

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction, Use Category UC3b for exterior construction.

B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.

C. Application: Treat items indicated on Drawings and plywood in contact with masonry or concrete or used with roofing, flashing, vapor barriers, and waterproofing.

2.4 FIRE-RETARDANT-TREATED PLYWOOD

A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire-Retardant-Treated Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
2. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
3. Design Value Adjustment Factors: Treated lumber plywood shall be tested according ASTM D 5516 and design value adjustment factors shall be calculated according to ASTM D 6305. Span ratings after treatment shall be not less than span ratings specified. For roof sheathing and where high-temperature fire-retardant treatment is indicated, span ratings for temperatures up to 170 deg F shall be not less than span ratings specified.

C. Kiln-dry material after treatment to a maximum moisture content of 15 percent.

D. Identify fire-retardant-treated plywood with appropriate classification marking of qualified testing agency.

E. Application: Treat plywood indicated on Drawings.

2.5 WALL SHEATHING

A. Plywood Wall Sheathing: Exterior sheathing.

B. Oriented-Strand-Board Wall Sheathing: Exposure 1 sheathing.

C. Paper-Surfaced Gypsum Wall Sheathing: ASTM C 1396/C 1396M, gypsum sheathing; with water-resistant-treated core and with water-repellent paper bonded to core's face, back, and long edges.

1. Type and Thickness: Type X, 5/8 inch thick.

D. Glass-Mat Gypsum Wall Sheathing: ASTM C 1177/1177M.

1. Type and Thickness: Type X, 5/8 inch thick.

E. Cementitious Backer Units: ASTM C 1325, Type A.

1. Thickness: 1/2 inch.

2.6 ROOF SHEATHING

A. Plywood Roof Sheathing: Exterior sheathing.

B. Oriented-Strand-Board Roof Sheathing: Exposure 1 sheathing.

2.7 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. For roof and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

2.8 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

A. Sealant for Paper-Surfaced Gypsum Sheathing: Elastomeric, medium-modulus, neutral-curing silicone joint sealant compatible with joint substrates formed by gypsum sheathing and other materials, recommended by sheathing manufacturer for application indicated and complying with requirements for elastomeric sealants specified in Section 07 92 00 "Joint Sealants."

B. Sealant for Glass-Mat Gypsum Sheathing: Silicone emulsion sealant complying with ASTM C 834, compatible with sheathing tape and sheathing and recommended by tape and sheathing manufacturers for use with glass-fiber sheathing tape and for covering exposed fasteners.

1. Sheathing Tape: Self-adhering glass-fiber tape, minimum 2 inches wide, 10 by 10 or 10 by 20 threads/inch, of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass-mat gypsum sheathing and with a history of successful in-service use.

2.9 MISCELLANEOUS MATERIALS

A. Adhesives for Field Gluing Panels to Framing: Formulation complying with APA AFG-01 ASTM D 3498 that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated, complying with the following:

1. NES NER-272 for power-driven fasteners.
2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."

D. Coordinate wall and roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

3.2 GYPSUM SHEATHING INSTALLATION

A. Comply with GA-253 and with manufacturer's written instructions.

1. Fasten gypsum sheathing to wood framing with nails or screws.
2. Fasten gypsum sheathing to cold-formed metal framing with screws.

3. Install boards with a 3/8-inch gap where non-load-bearing construction abuts structural elements.
4. Install boards with a 1/4-inch gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.

B. Seal sheathing joints according to sheathing manufacturer's written instructions.

1. Apply elastomeric sealant to joints and fasteners and trowel flat. Apply sufficient amount of sealant to completely cover joints and fasteners after troweling. Seal other penetrations and openings.
2. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing joints and apply and trowel silicone emulsion sealant to embed entire face of tape in sealant. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered. Seal other penetrations and openings.

3.3 CEMENTITIOUS BACKER UNIT INSTALLATION

A. Install panels and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated.

END OF SECTION 06 16 00

SECTION 06 20 23 - INTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior trim.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Lumber: DOC PS 20.

1. Factory mark each piece of lumber with grade stamp of inspection agency indicating grade, species, moisture content at time of surfacing, and mill.

a. For exposed lumber, mark grade stamp on end or back of each piece, or omit grade stamp and provide certificates of grade compliance issued by inspection agency.

B. Softwood Plywood: DOC PS 1.

C. Hardboard: AHA A135.4.

D. MDF: ANSI A208.2, Grade 130, made with binder containing no urea-formaldehyde resin.

E. Particleboard: ANSI A208.1, Grade M-2, made with binder containing no urea-formaldehyde resin.

F. Melamine-Faced Particleboard: Particleboard complying with ANSI A208.1, Grade M-2, finished on both faces with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD3, Grade VGL, for test methods 3.3, 3.4, 3.6, 3.8, and 3.10.

1. Color: As selected by Architect from manufacturer's full range.

2.2 FIRE-RETARDANT-TREATED MATERIALS

A. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, with no evidence of significant progressive combustion when the test is extended an additional

20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Kiln dry lumber and plywood after treatment to a maximum moisture content of 19 and 15 percent respectively.

B. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.

1. For exposed lumber and plywood indicated to receive a stained or natural finish, mark back of each piece.

C. Application: Where indicated.

2.3 INTERIOR TRIM

A. Softwood Lumber Trim:

1. Species and Grade: Eastern white, Idaho white, lodgepole, ponderosa, radiata, or sugar pine; C Select (Choice); NeLMA, NLGA, or WWPA.
2. Species and Grade: Douglas fir-larch or Douglas fir south, Superior or C & Btr finish; NLGA, WCLIB, or WWPA.
3. Species and Grade: Southern pine, B & B finish; SPIB.
4. Maximum Moisture Content: 15 percent.

B. Softwood Moldings for Transparent Finish (Stain or Clear Finish): WMMPA WM 4, N-grade wood moldings. Made to patterns included in WMMPA WM 12.

1. Species: Eastern white, Idaho white, lodgepole, ponderosa, radiata, or sugar pine, Southern pine, Douglas fir.
2. Maximum Moisture Content: 15 percent.

C. Moldings for Opaque Finish (Painted Finish): Made to patterns included in WMMPA WM 12.

1. Softwood Moldings: WMMPA WM 4, P grade.

a. Species: Eastern white, Idaho white, lodgepole, ponderosa, radiata, or sugar pine.
b. Maximum Moisture Content: 15 percent.

2. Optional Material: Primed MDF.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours unless longer conditioning is recommended by manufacturer.

3.2 INSTALLATION, GENERAL

A. Install interior finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.

1. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
2. Countersink fasteners, fill surface flush, and sand unless otherwise indicated.
3. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining interior finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.

3.3 STANDING AND RUNNING TRIM INSTALLATION

A. Install with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Miter at returns, miter at outside corners, and cope at inside corners to produce tight-fitting joints with full-surface contact throughout length of joint. Use scarf joints for end-to-end joints.

END OF SECTION 06 20 23

SECTION 06 64 00 - PLASTIC PANELING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes plastic sheet paneling.

PART 2 - PRODUCTS

2.1 PLASTIC SHEET PANELING

A. Glass-Fiber-Reinforced Plastic Paneling: Gelcoat-finished, glass-fiber-reinforced plastic panels complying with ASTM D 5319. Panels shall be USDA accepted for incidental food contact.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Crane Composites, Inc.

1) 23525 W Eames Street Channahon, IL 60410, John S. Beck, CSI, CCPR (704) 830-8653, jbeck@cranecomposites.com

b. Marlite

1) 202 Harger Street Dover, OH 44622, (603)924-9128, Jamie McEdward (330)260-7627, jmcedward@marlite.com

2. Surface-Burning Characteristics: As follows when tested by a qualified testing agency according to ASTM E 84. Identify products with appropriate markings of applicable testing agency.

a. Flame-Spread Index: 200 or less.
b. Smoke-Developed Index: 450 or less.

3. Nominal Thickness: Not less than 3/32” (0.09 inch) laminated to substrate indicated on drawings.
4. Surface Finish: Molded pebble texture.
5. Color: As indicated on the drawings.

B. Non-Reinforced Plastic Paneling

1. Manufacturers:
   a. Parkland Plastics: Dur-A-Lux line.
   b. Impact Specialties: Acrovyn wall covering

2. Color: As indicated on the drawings.

2.2 ACCESSORIES

A. Trim Accessories: Manufacturer's standard one-piece vinyl extrusions designed to retain and cover edges of panels. Provide division bars, inside corners, outside corners, and caps as needed to conceal edges.

1. Color: Match panels.

B. Sealant: Mildew-resistant, single-component, neutral-curing silicone sealant recommended by plastic paneling manufacturer and complying with requirements in Section 07 92 00 "Joint Sealants."

2.3 VAPOR RETARDERS

A. Polyethylene Vapor Retarders: ASTM D 4397, 6 mils thick, with maximum permeance rating of 0.13 perm.

B. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

C. Locations specified on the drawings.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrates of substances that could impair adhesive bond, including oil, grease, dirt, and dust.

B. Condition panels by unpacking and placing in installation space before installation according to manufacturer's written recommendations.

C. Lay out paneling before installing. Locate panel joints to provide equal panels at ends of walls not less than half the width of full panels.

3.2 INSTALLATION

A. Install plastic paneling according to manufacturer's written instructions.

B. Install panels in a full spread of adhesive.

C. Install trim accessories with adhesive and nails or staples. Do not fasten through panels.

D. Fill grooves in trim accessories with sealant before installing panels, and bed inside corner trim in a bead of sealant.

E. Maintain uniform space between panels and wall fixtures. Fill space with sealant.

F. Remove excess sealant and smears as paneling is installed. Clean with solvent recommended by sealant manufacturer and then wipe with clean dry cloths until no residue remains.

G. Secure 6 mil poly vapor barrier to block wall.

H. Secure metal furring strips flat against masonry walls with one (1) vertical strip every 2'-0" on center. Provide horizontal strips at the bottom, top, and 8'-0" level. Furring strips are not needed when applying FRP to stud walls.

END OF SECTION 06 64 00

SECTION 07 11 13 - BITUMINOUS DAMPPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes cold-applied, emulsified-asphalt dampproofing.

1.2 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by dampproofing manufacturer, and has satisfactorily applied the type of dampproofing specified on projects which have been completed in the last five years.

1.3 WARRANTY

A. Manufacturer's Warranty: Manufacturer's standard materials-only warranty in which manufacturer agrees to furnish replacement waterproofing material for waterproofing that does not comply with requirements or that fails to remain watertight within specified warranty period.

B. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. VOC Content: Products shall comply with VOC content limits of authorities having jurisdiction unless otherwise required.

2.2 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

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. BASF Construction Chemicals - Building Systems; Sonneborn Brand Products.
2. Euclid Chemical Company (The); an RPM company.
3. Karnak Corporation.
4. Meadows, W. R., Inc.

B. Trowel Coats: ASTM D 1227, Type II, Class 1.

C. Fibered Brush and Spray Coats: ASTM D 1227, Type II, Class 1.

D. Brush and Spray Coats: ASTM D 1227, Type III, Class 1.

2.3 AUXILIARY MATERIALS

A. General: Furnish auxiliary materials recommended in writing by dampproofing manufacturer for intended use and compatible with bituminous dampproofing.

B. Emulsified-Asphalt Primer: ASTM D 1227, Type III, Class 1, except diluted with water as recommended in writing by manufacturer.

C. Asphalt-Coated Glass Fabric: ASTM D 1668, Type I.

D. Protection Course: Extruded-polystyrene board insulation, unfaced, ASTM C 578, Type X, 1/2 inch thick.

PART 3 - EXECUTION

3.1 APPLICATION, GENERAL

A. Comply with manufacturer's written instructions for substrate preparation, dampproofing application, cure time between coats, and drying time before backfilling unless more stringent requirements are indicated.

1. Apply dampproofing to provide continuous plane of protection.
2. Apply additional coats if recommended in writing by manufacturer or to achieve a smooth surface and uninterrupted coverage.

B. Where dampproofing footings and foundation walls, apply from finished-grade line to top of footing; extend over top of footing and down a minimum of 6 inches over outside face of footing.

1. Extend dampproofing 12 inches onto intersecting walls and footings, but do not extend onto surfaces exposed to view when Project is completed.
2. Install flashings and corner protection stripping at internal and external corners, changes in plane, construction joints, cracks, and where shown as "reinforced," by embedding an 8-inch- wide strip of asphalt-coated glass fabric in a heavy coat of dampproofing. Dampproofing coat for embedding fabric is in addition to other coats required.

C. Where dampproofing exterior face of inner wythe of exterior masonry cavity walls, lap dampproofing at least 1/4 inch onto flashing, masonry reinforcement, veneer ties, and other items that penetrate inner wythe.

1. Extend dampproofing over outer face of structural members and concrete slabs that interrupt inner wythe.
2. Lap dampproofing at least 1/4 inch onto shelf angles supporting veneer.

3.2 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

A. Concrete Foundations and Parged Masonry Foundation Walls: Apply two brush or spray coats at not less than 1.5 gal./100 sq. ft. for first coat and 1 gal./100 sq. ft. for second coat, one fibered brush or spray coat at not less than 3 gal./100 sq. ft., or one trowel coat at not less than 4 gal./100 sq. ft..

B. Unparged Masonry Foundation Walls: Apply primer and two brush or spray coats at not less than 1.5 gal./100 sq. ft. for first coat and 1 gal./100 sq. ft. for second coat, primer and one fibered brush or spray coat at not less than 3 gal./100 sq. ft. or primer and one trowel coat at not less than 5 gal./100 sq. ft..

C. Unexposed Face of Concrete Retaining Walls: Apply one brush or spray coat at not less than 1.25 gal./100 sq. ft..

D. Unexposed Face of Masonry Retaining Walls: Apply primer and one brush or spray coat at not less than 1.25 gal./100 sq. ft..

E. Concrete Backup for Brick Veneer Assemblies: Apply one brush or spray coat at not less than 1 gal./100 sq. ft..

F. Masonry Backup for Brick Veneer Assemblies: Apply primer and one brush or spray coat at not less than 1 gal./100 sq. ft..

G. Exterior Face of Inner Wythe of Cavity Walls: Apply primer and one brush or spray coat at not less than 1 gal./100 sq. ft..

H. Interior Face of Exterior Concrete Walls: Where above grade and indicated to be furred and finished, apply one brush or spray coat at not less than 1 gal./100 sq. ft..

I. Interior Face of Single-Wythe Exterior Masonry Walls: Where above grade and indicated to be furred and finished, apply primer and one brush or spray coat at not less than 1 gal./100 sq. ft..

3.3 INSTALLATION OF PROTECTION COURSE

A. Where indicated, install protection course over completed-and-cured dampproofing. Comply with dampproofing-material and protection-course manufacturers' written instructions for attaching protection course.

END OF SECTION 07 11 13

SECTION 071326 - SELF-ADHERING SHEET WATERPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes self-adhering modified bituminous sheet waterproofing.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Sample warranties.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by waterproofing manufacturer.

1.5 WARRANTY

A. Manufacturer's Warranty: Manufacturer's standard materials-only warranty in which manufacturer agrees to furnish replacement waterproofing material for waterproofing that does not comply with requirements or that fails to remain watertight within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

B. Contractor Warranty:

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MODIFIED BITUMINOUS SHEET WATERPROOFING

A. Modified Bituminous Sheet: Minimum 60-mil nominal thickness, self-adhering sheet consisting of 56 mils of rubberized asphalt laminated on one side to a 4-mil- thick, polyethylene-film reinforcement, and with release liner on adhesive side; formulated for

application with primer or surface conditioner that complies with VOC limits of authorities having jurisdiction.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. American Hydrotech, Inc; VM75.
    b. Carlisle Coatings & Waterproofing Inc; CCW MiraDRI 860/861.
    c. Grace Construction Products; W.R. Grace & Co. -- Conn; Bituthene 4000.
    d. Meadows, W.R.,Inc; SealTight Mel-Rol.

2. Sheet Strips: Self-adhering, rubberized-asphalt strips of same material and thickness as sheet waterproofing.

2.2 AUXILIARY MATERIALS

A. General: Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.

1. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.

B. Primer: Liquid waterborne primer recommended for substrate by sheet-waterproofing material manufacturer.

C. Surface Conditioner: Liquid, waterborne surface conditioner recommended for substrate by sheet-waterproofing material manufacturer.

D. Liquid Membrane: Elastomeric, two-component liquid, cold fluid applied, of trowel grade or low viscosity.

E. Substrate Patching Membrane: Low-viscosity, two-component, modified asphalt coating.

F. Metal Termination Bars: Aluminum bars, approximately 1 by 1/8 inch thick, predrilled at 9-inch centers.

G. Protection Course: Extruded-polystyrene board insulation, unfaced, ASTM C 578, Type X, 1/2 inch thick.

2.3 MOLDED-SHEET DRAINAGE PANELS

A. Molded-Sheet Drainage Panel: Comply with Section 334600 "Subdrainage."

2.4 INSULATION DRAINAGE PANELS

A. Unfaced Wall-Insulation Drainage Panels: Extruded-polystyrene board insulation complying with ASTM C 578, Type IV, 25-psi minimum compressive strength; unfaced;

fabricated with shiplap or channel edges and with one side having grooved drainage channels.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. DiversiFoam Products; CertiFoam 25 SL.
    b. Dow Chemical Company (The); STYROFOAM Brand PERIMATE Insulation.

PART 3 - EXECUTION

3.1 MODIFIED BITUMINOUS SHEET-WATERPROOFING APPLICATION

A. Prepare surfaces and install modified bituminous sheets according to waterproofing manufacturer's written instructions and recommendations in ASTM D 6135.

B. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Reprime areas exposed for more than 24 hours.

C. Apply and firmly adhere sheets over area to receive waterproofing. 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 watertight installation.

1. When ambient and substrate temperatures range between 25 and 40 deg F, install self-adhering, modified bituminous sheets produced for low-temperature application. Do not use low-temperature sheets if ambient or substrate temperature is higher than 60 deg F.

D. Apply continuous sheets over already-installed sheet strips, bridging substrate cracks, construction, and contraction joints.

E. Seal edges of sheet-waterproofing terminations with mastic.

F. Install sheet-waterproofing and auxiliary materials to tie into adjacent waterproofing.

G. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fishmouths and blisters. Patch with sheet waterproofing extending 6 inches beyond repaired areas in all directions.

H. Immediately install protection course with butted joints over waterproofing membrane.

1. Insulation drainage panels may be used in place of a separate protection course to vertical applications when approved by waterproofing manufacturer and installed immediately.

3.2 INSULATION DRAINAGE-PANEL INSTALLATION

A. Install insulation drainage panels over waterproofed surfaces; cut and fit to within 3/4 inch of projections and penetrations.

B. Ensure that drainage channels are aligned and free of obstructions.

C. On vertical surfaces, set insulation drainage panels in adhesive or tape applied according to manufacturer's written instructions.

D. On horizontal surfaces, loosely lay insulation drainage panels according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

3.3 PROTECTION, REPAIR, AND CLEANING

A. Do not permit foot or vehicular traffic on unprotected membrane.

B. Protect installed insulation drainage panels from damage due to UV light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

C. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

D. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 07 13 26

SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Glass-fiber blanket insulation.
2. Foam plastic board insulation.
3. Foam Insulation for CMU walls
4. Vapor retarders.

B. Refer to drawings for insulation locations

C. See Division 7, single ply membrane roofing for roof insulation.

1.2 ACTION SUBMITTALS

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

PART 2 - PRODUCTS

2.1 FOAM-PLASTIC BOARD INSULATION

A. Extruded-Polystyrene Board Insulation: ASTM C 578, with maximum flame-spread and smoke-developed indexes of 75 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.
c. Pactiv Building Products.

2. Type VI, 40 psi (276 kPa).

2.2 GLASS-FIBER BLANKET INSULATION

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, the following:

1. CertainTeed Corporation.

2. Johns Manville.
3. Owens Corning.

B. Foil-Faced, Glass-Fiber Blanket Insulation: ASTM C 665, Type III (reflective faced), Class B (faced surface with a flame-propagation resistance of 0.12 W/sq. cm); Category 1 (membrane is a vapor barrier), faced with foil scrim, foil-scrim kraft, or foil-scrim polyethylene.

C. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

2.3 FOAM INSULATION FOR CMU WALLS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, the following:

1. **"Core-Fill 500™"** as manufactured by Tailored Chemical ProductsP.O. Drawer 4186, Hickory, N.C. 28603 (800) 627-1687
2. Polymaster by Polymaster Inc.
3. Thermco by Thermco Corp. of America
4. Core foam masonry Foam Insulation by cfiFOAM.
5. **FOR NEW JERSEY STORES ONLY –** due to urea-formaldahyde being prohibited, the following products are acceptable

    a. InsulSmart Interior Foam Insulation MH by cfiFOAM, Inc., Knoxville TN.
    b. Tripolymer 105 by C.P. Chemical Company, Inc, White Plains NY.

B. Properties:

1. Fire-Resistance Ratings: Minimum two hour fire resistance wall rating (ASTM E-119) for 8" and 12" concrete masonry units when used in standard two (2) hour rated CMUs.
2. Surface Burning Characteristics: (ASTM E84) maximum flame spread, smoke developed at 4inch thickness meets Class 1 or Class A classification
3. Combustion Characteristics: Must be noncombustible, Class A building material.
4. Thermal Values: "R" Value of 4.63/inch @ 25 degrees F mean; ASTM C-518.
5. Sound Abatement: Minimum Sound Transmission Class ("STC") rating of 52

2.4 LOOSE-FILL INSULATION

A. Cellulosic-Fiber Loose-Fill Insulation: ASTM C 739, chemically treated for flame-resistance, processing, and handling characteristics.

B. Glass-Fiber Loose-Fill Insulation: ASTM C 764, Type I for pneumatic application or Type II for poured application; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E 84.

2.5 VAPOR RETARDERS

A. Polyethylene Vapor Retarders: ASTM D 4397, 6 mils thick, with maximum permeance rating of 0.13 perm.

B. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

C. Locations specified on the drawings.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

1. Materials shall be delivered to the site in the original sealed containers or packages and shall bear the manufacturer’s name and brand designation. Materials shall be stored and handled in a manner to protect them from damage during the entire construction period. Insulation that has been allowed to become wet shall be considered by Food Lion to be unusable and will be returned to the manufacturer and replaced with new at the contractor’s expense.

C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.2 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with

adhesive or use mechanical anchorage to provide permanent placement and support of units.

B. Glass-Fiber or Mineral-Wool Blanket Insulation: Install in cavities formed by framing members according to the following requirements:

1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
4. Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.
5. 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.
6. Vapor-Retarder-Faced Blankets: Tape joints and ruptures in vapor-retarder facings, and seal each continuous area of insulation to ensure airtight installation.

    a. Exterior Walls: Set units with facing placed toward interior of construction as indicated on Drawings.
    b. Interior Walls: Set units with facing placed toward areas of high humidity.

C. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:

1. Loose-Fill Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft..

3.3 INSTALLATION OF FOAM INSULATION FOR CMU WALLS

A. Comply with manufacturer’s printed recommendations.

3.4 INSTALLATION OF VAPOR RETARDERS

A. Place vapor retarders on side of construction indicated on Drawings. Extend vapor retarders to extremities of areas to protect from vapor transmission. Secure vapor retarders in place with adhesives or other anchorage system as indicated. Extend vapor retarders to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.

B. Seal vertical joints in vapor retarders over framing by lapping no fewer than two studs.

1. Before installing vapor retarders, apply urethane sealant to flanges of metal framing including runner tracks, metal studs, and framing around door and window openings. Seal overlapping joints in vapor retarders with vapor-retarder

tape according to vapor-retarder manufacturer's written instructions. Seal butt joints with vapor-retarder tape. Locate all joints over framing members or other solid substrates.

2. Firmly attach vapor retarders to metal framing and solid substrates with vapor-retarder fasteners as recommended by vapor-retarder manufacturer.

C. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarders.

D. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarders.

END OF SECTION 07 21 00

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.

1.2 CLOSEOUT SUBMITTALS

A. Maintenance data submitted to Owner.

B. Warranty data:

1. Manufacturer’s standard warranty: 12 year Compound Warranty from the date of the Owner’s final acceptance
2. Special Finish Warranty: Manufacturer’s standard form in which the manufacturer agrees to repair finishes that show evidence of deterioration within 6 years of substantial completion. Deterioration includes, but not limited to: color fade, chalking, cracking, peeling, and loss of color integrity.

1.3 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.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Dryvit Systems, Inc. - Bob Dazel, AIA, CSI, LEED GA Business Development - National Accounts (734) 276.0404 (bob.dazel@dryvit.com)

   a. Dryvit - Outsulation Plus MD System.

2. Parex USA, Inc. – Randy Campbell, Architectural Sales and National Accounts (770) 359-9398 (randy.campbell@parexusa.com

a. Parex - Standard WaterMaster System.

3. Sto Corp. - Tim Salerno, Strategic Accounts Manager (407) 466-5371 (tsalernosto@earthlink.net)

a. Sto Corp. – StoTherm ci Essence System.

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 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.

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. Primer: EIFS manufacturer's standard factory-mixed, elastomeric-polymer primer for preparing base-coat surface for application of finish coat.

I. Finish-Coat Materials: EIFS manufacturer's standard acrylic-based coating.

1. Colors: As indicated on Architect's front elevation.
2. Textures: Sand (fine) texture.

J. 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.

2.4 Delivery, Storage, and Handling

A. All EIFS materials shall be delivered in their original sealed containers bearing the manufacturer’s name and identification of product with written application instructions, and appropriate health, hazard, and safety data.

B. Protect stored materials from extreme heat, sun, and frost. Factory proportioned bagged materials shall be stored off the ground and protected from moisture.

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.

E. 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.

F. 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.

G. 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.

H. Foam Build-Outs: Fully embed reinforcing mesh in base coat.

I. 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.

J. Finish Coat: Apply over drybase 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 07 24 19

SECTION 072500 - WEATHER BARRIERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Building wrap.
2. Flexible flashing.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 WATER-RESISTIVE BARRIER

A. Building Wrap: ASTM E 1677, Type I air barrier; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested according to ASTM E 84; UV stabilized; and acceptable to authorities having jurisdiction.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Dow Chemical Company (The); Styrofoam Weathermate Plus Brand Housewrap.
b. DuPont (E. I. du Pont de Nemours and Company); Tyvek CommercialWrap.
c. Raven Industries Inc.; Fortress Pro Weather Protective Barrier.

2. Water-Vapor Permeance: Not less than 50 g through 1 sq. m of surface in 24 hours per ASTM E 96/E 96M, Desiccant Method (Procedure A).

B. Building-Wrap Tape: Pressure-sensitive plastic tape recommended by building-wrap manufacturer for sealing joints and penetrations in building wrap.

2.2 MISCELLANEOUS MATERIALS

A. Flexible Flashing: Self-adhesive butyl rubber or rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. DuPont (E. I. du Pont de Nemours and Company); DuPont Flashing Tape.
    b. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Vycor Butyl Self Adhered Flashing.
    c. Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.

PART 3 - EXECUTION

3.1 WATER-RESISTIVE BARRIER INSTALLATION

A. Cover sheathing with water-resistive barrier as follows:

1. Cut back barrier 1/2 inch on each side of the break in supporting members at expansion- or control-joint locations.
2. Apply barrier to cover vertical flashing with a minimum 4-inch overlap unless otherwise indicated.

B. Building Wrap: Comply with manufacturer's written instructions.

1. Seal seams, edges, fasteners, and penetrations with tape.
2. Extend into jambs of openings and seal corners with tape.

3.2 FLEXIBLE FLASHING INSTALLATION

A. Apply flexible flashing where indicated to comply with manufacturer's written instructions.

1. Lap seams and junctures with other materials at least 4 inches except that at flashing flanges of other construction, laps need not exceed flange width.
2. Lap flashing over water-resistive barrier at bottom and sides of openings.
3. Lap water-resistive barrier over flashing at heads of openings.

END OF SECTION 07 25 00

SECTION 072726 - FLUID-APPLIED MEMBRANE AIR BARRIERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes fluid-applied, vapor-permeable membrane air barriers.

1.2 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General: Air barrier shall be capable of performing as a continuous vapor- permeable 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.

2.2 VAPOR-PERMEABLE MEMBRANE AIR-BARRIER

A. Fluid-Applied, Vapor-Permeable Membrane Air Barrier: Elastomeric, modified bituminous or synthetic polymer membrane.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Elastomeric, Modified Bituminous Membrane:

1) Henry Company; Air-Bloc 07.
2) Hohmann & Barnard, Inc.; Textroflash Liquid VP.
3) Tremco Incorporated, an RPM company; ExoAir 220R.

b. Synthetic Polymer Membrane:

1) Grace, W. R., & Co. - Conn.; Perm-A-Barrier VP.
2) Henry Company; Air-Bloc 31.
3) Tremco Incorporated, an RPM company; ExoAir 230.

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. Vapor Permeance: Minimum 10 perms; ASTM E 96/E 96M.
   c. Ultimate Elongation: Minimum 200 percent; ASTM D 412, Die C.

2.3 ACCESSORY MATERIALS

A. General: Accessory materials recommended by air-barrier manufacturer to produce a complete air-barrier assembly and compatible with primary air-barrier material.

B. Sprayed Polyurethane Foam Sealant: One- or two-component, foamed-in-place, polyurethane foam sealant, 1.5- to 2.0-lb/cu. ft density; flame-spread index of 25 or less according to ASTM E 162; with primer and noncorrosive substrate cleaner recommended by foam sealant manufacturer.

C. Termination Mastic: Air-barrier manufacturer's standard cold fluid-applied elastomeric liquid; trowel grade.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

A. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.

B. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching membrane.

C. Remove excess mortar from masonry ties, shelf angles, and other obstructions.

D. 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.

3.2 INSTALLATION

A. General: Install fluid-applied membrane air-barrier and accessory materials according to air-barrier manufacturer's written instructions to form a seal with adjacent construction and maintain a continuous air barrier.

   1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
   2. Install air-barrier assembly on roofing membrane or base flashing so that a minimum of 3 inches of coverage is achieved over each substrate.

B. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by fluid air-barrier material on same day. Reprime areas exposed for more than 24 hours.

1. Prime glass-fiber-surfaced gypsum sheathing with number of prime coats needed to achieve required bond, with adequate drying time between coats.

C. Connect and seal exterior wall air-barrier material 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.

D. At end of each working day, seal top edge of air barrier to substrate with termination mastic.

E. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply transitions and flashing so that a minimum of 3 inches of coverage is achieved over each substrate. Maintain 3 inches of full contact over firm bearing to perimeter frames with not less than 1 inch of full contact.

F. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air-barrier material with foam sealant.

G. Seal air-barrier assembly around masonry reinforcing or ties and penetrations with termination mastic.

H. Seal top of through-wall flashings to air barrier.

I. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.

J. Repair punctures, voids, and deficient lapped seams. Slit and flatten fishmouths and blisters. Extend patches 6 inches beyond repaired areas.

K. Fluid-Applied Membrane Material: Apply a continuous unbroken air-barrier membrane to substrates according to the following thickness. Apply air-barrier membrane in full contact around protrusions such as masonry ties.

1. Vapor-Permeable Membrane Air Barrier: Total dry film thickness as recommended in writing by manufacturer to meet performance requirements, but not less than 40-mil dry film thickness, applied in one or more equal coats.

L. Do not cover air barrier until it has been tested and inspected by Owner's testing agency.

M. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Inspections: Air-barrier materials, accessories, and installation are subject to inspection for compliance with requirements.

C. Tests: As determined by Owner's testing agency from among the following tests:

D. Air barriers will be considered defective if they do not pass tests and inspections.

1. Apply additional air-barrier material, according to manufacturer's written instructions, where inspection results indicate insufficient thickness.
2. Remove and replace deficient air-barrier components for retesting as specified above.

E. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.

F. Protect air-barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.

1. Protect air barrier from exposure to UV light and harmful weather exposure as required by manufacturer. If exposed to these conditions for more than 60 days, remove and replace air barrier or install additional, full-thickness, air-barrier application after repairing and preparing the overexposed membrane according to air-barrier manufacturer's written instructions.
2. Protect air barrier from contact with incompatible materials and sealants not approved by air-barrier manufacturer.

G. Remove masking materials after installation.

END OF SECTION 07 27 26

SECTION 075423 - THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Mechanically fastened thermoplastic polyolefin (TPO) roofing system.
2. Roof insulation.

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 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing system to include in maintenance manuals to be submitted to the Owner.

B. Warranty data as indicated below.

1.4 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.

1.5 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period. The manufacturer’s warranty shall cover the total cost of the repairs of the material, including roof insulation and labor at the time a leak does occur and shall not be contingent upon the original installed cost of the roof nor shall it be prorated over the life of the roof.

1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Carlisle SynTec Incorporated.
2. Firestone Building Products.
3. GAF Materials Corporation.
4. GenFlex Roofing Systems.
5. Johns Manville.
6. Versico Incorporated.

B. 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. Exterior Fire-Test Exposure: ASTM E 108 or UL 790, Class B; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

D. Fire-Resistance Ratings: Comply with fire-resistance-rated assembly designs indicated. Identify products with appropriate markings of applicable testing agency.

2.3 TPO ROOFING

A. Fabric-Reinforced TPO Sheet: ASTM D 6878, internally fabric- or scrim-reinforced, uniform, flexible TPO sheet.

1. Thickness: 60 mils, nominal.
2. 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 unreinforced TPO sheet flashing, 55 mils thick, minimum, of same color as TPO sheet.

C. Bonding Adhesive: Manufacturer's standard recommendation.

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.

2.5 ROOF INSULATION

A. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 2, felt or glass-fiber mat facer on both major surfaces.

1. Minimum roof R value to be 24 (4" Thickness) unless otherwise indicated on the drawings.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Carlisle SynTec Incorporated.
b. Firestone Building Products.
c. GAF Materials Corporation.
d. Johns Manville.

B. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of 1/4 inch per 12 inches unless otherwise indicated.

2.6 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.

2.7 WALKWAYS

A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway rolls, approximately 3/16 inch 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 the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

3.2 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 2.6 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 in each direction. Where a two layer application is required, the initial 2” layer of polyisocyanurate foam shall be overlaid with a 4’x8’ panel of High Density Fiberboard Roof Insulation.

D. Mechanically Fastened Insulation: Install each layer of insulation and secure to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.

1. Fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.

3.3 MECHANICALLY FASTENED ROOFING INSTALLATION

A. Mechanically fasten roofing over area to receive roofing according to roofing system manufacturer's written instructions. Unroll roofing and allow to relax before retaining.

B. Accurately align roofing, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

C. Mechanically fasten or adhere roofing securely at terminations, penetrations, and perimeter of roofing.

D. Apply roofing with side laps shingled with slope of roof deck where possible.

E. In-Seam Attachment: Secure one edge of TPO sheet using fastening plates or metal battens centered within seam, and mechanically fasten TPO sheet to roof deck.

F. 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.

G. Spread sealant bed over deck-drain flange at roof drains, and securely seal roofing in place with clamping ring.

3.4 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].

3.5 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 as not to void roof warranty.

3.6 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 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 07 54 23

SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Formed roof-drainage sheet metal fabrications.
2. Formed low-slope roof sheet metal fabrications.
3. Formed steep-slope sheet metal fabrications.
4. Formed wall sheet metal fabrications.

1.2 CLOSEOUT SUBMITTALS

A. Maintenance data submitted to Owner.

B. Warranty data as outlined below.

1.3 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.

1.4 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. Failures include, but are not limited to, the following:

a. Structural failures, including rupturing, cracking, or puncturing.
b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Period: Twenty 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. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.

c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 30 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. SPRI Wind Design Standard: Manufacture and install copings, roof edge flashings tested according to SPRI ES-1 and capable of resisting the following design pressure:

1. Design Pressure: As indicated on Drawings.

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F, 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. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, dead soft, fully annealed; 2D (dull, cold rolled) finish unless otherwise indicated on the drawings.

C. Metallic-Coated Steel Sheet: Provide aluminum-zinc alloy-coated steel sheet according to ASTM A 792/A 792M, Class AZ55 coating designation, Grade 50; pre-painted by coil-coating process to comply with ASTM A 755/A 755M.

1. Exposed Coil-Coated Finish:

a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

2. Color: As indicated on the drawings.

2.3 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Underlayment: Provide self-adhering, cold-applied, sheet underlayment, a minimum of 60 mils 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. Products: Subject to compliance with requirements, provide one of the following:

    a. Mid-States Asphalt; QUIK-Stick HT

    b. Carlisle Residential, a division of Carlisle Construction Materials; WIP 300HT.

    c. Grace Construction Products, a unit of W. R. Grace & Co.-Conn.; Grace Ice and Water Shield HT.

2. Thermal Stability: Stable after testing at 240 deg F, ASTM D 1970.
3. Low-Temperature Flexibility: Passes after testing at minus 20 deg F; ASTM D 1970.

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 or manufactured item unless otherwise indicated.

B. Fasteners: Wood screws, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.

1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.

    a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
    b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
    c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.

2. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
3. Fasteners for Aluminum-Zinc Alloy-Coated Steel Sheet: Series 300 stainless steel or hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

C. Solder:

1. For Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.

D. Sealant Tape: Pressure-sensitive, 100 percent solids, gray Butyl sealant tape with release-paper backing;3/4 inch wide and 1/8 inch thick.

E. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

F. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

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 MANUFACTURED REGLETS

A. Reglets: Units of type, material, and profile required, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with factory-mitered and -welded corners and junctions and with interlocking counterflashing on exterior face, of same metal as reglet.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Metal Roofing Systems, Inc. Reglet "Springlock", 24 ga.
2. Material: Galvalume steel, 24 ga. thick.
3. Finish: With manufacturer's standard color coating.

2.6 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 deep, filled with butyl sealant concealed within joints.
2. Use lapped expansion joints only where indicated on Drawings.

C. Sealant Joints: Where movable, non-expansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.

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 thickness of metal being secured.

2.7 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 10'-0" 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 not less than twice the gutter thickness. Fabricate expansion joints, expansion-joint covers, and gutter accessories from same metal as gutters. Manufacture interior and exterior clinched mitered corners.

B. Downspouts: Fabricate rectangular downspouts to dimensions indicated, complete with mitered elbows. Furnish with metal hangers from same material as downspouts and anchors. Shop fabricate elbows.

1. Fabricate from the following materials:

a. Aluminum-Zinc Alloy-Coated Steel: 24 ga.thick.

C. Parapet Scuppers: Fabricate scuppers to dimensions required, with closure flange trim to exterior, 4-inch- wide wall flanges to interior, and base extending 4 inches beyond cant or tapered strip into field of roof. Fabricate from the following materials:

1. Aluminum-Zinc Alloy-Coated Steel: 24 ga. thick.

D. Conductor Heads: Fabricate conductor heads with flanged back and stiffened top edge and of dimensions and shape required, complete with outlet tubes. Fabricate from the following materials:

1. Aluminum-Zinc Alloy-Coated Steel: 24 ga. thick.

E. Splash Pans: Fabricate to dimensions and shape required and from the following materials:

1. Stainless Steel: 26 ga, thick.

2.8 FABRICATED ES-1 TESTED ROOF EDGE COMPONENTS.

A. Roof Edge Flashing (Gravel Stop): Fabricate in minimum 10’ - 0” long sections. Furnish with 6-inch-wide, joint splice plates. Manufacture interior and exterior Clinched mitered corners. Third party ES-1 Testing is not acceptable.

1. Fabricate from the Following Materials:

a. Aluminum-Zinc Alloy-Coated Steel: 24 ga. thick.

B. Copings: Fabricate in minimum 10'-0" long sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and interior leg. Factory mitered, clinched corners, fasten and seal watertight. Manufacture interior and exterior Clinched mitered corners. Third party ES-1 testing not acceptable.

1. Fabricate ANSI SPRI ES-1 tested copings from the Following Materials:

a. Aluminum-Zinc Alloy-Coated Steel: 24 ga. thick.

C. Base Flashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:

1. Aluminum-Zinc Alloy-Coated Steel: 24 ga. thick.

D. Counterflashing and Flashing Receivers: Fabricate from the following materials:

1. Aluminum-Zinc Alloy-Coated Steel: 24 ga.thick.

E. Roof-Penetration Flashing: Fabricate from the following materials:

1. Aluminum-Zinc Alloy-Coated Steel: 24 ga. thick.

F. Roof-Drain Flashing: Fabricate from the following materials:

1. Stainless Steel: 26 ga. thick.

2.9 STEEP-SLOPE ROOF SHEET METAL FABRICATIONS

A. Apron, Step, Cricket, and Backer Flashing: Fabricate from the following materials:

1. Aluminum-Zinc Alloy-Coated Steel: 24 ga. thick.

B. Valley Flashing: Fabricate from the following materials:

1. Aluminum-Zinc Alloy-Coated Steel: 24 ga. thick.

C. Drip Edges: Fabricate from the following materials:

1. Aluminum-Zinc Alloy-Coated Steel: 24 ga. thick.

D. Eave, Rake, Ridge, and Hip Flashing: Fabricate from the following materials:

1. Aluminum-Zinc Alloy-Coated Steel: 24 ga. thick.

2.10 WALL SHEET METAL FABRICATIONS

A. Through-Wall Flashing: Fabricate continuous flashings in minimum 10'-0" long sections, under copings, and at shelf angles. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches beyond each side of wall openings; and form with 2-inch- high, end dams. Fabricate from the following materials:

1. Stainless Steel: 26 ga. thick.

B. Opening Flashings in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings. Form head and sill flashing with 2-inch- high, end dams. Fabricate from the following materials:

1. Aluminum-Zinc Alloy-Coated Steel: 24 ga. thick.

C. Wall Expansion-Joint Cover: Fabricate from the following materials:

1. Aluminum-Zinc Alloy-Coated Steel: 24 ga. thick.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
3. Space cleats not more than 12 inches 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 with no joints within 24 inches of corner or intersection.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch 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 3/4 inch for wood screws, or penetrate the substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

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; however, reduce pre-tinning where pre-tinned surface would show in completed Work.

1. Do not solder metallic-coated steel 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.
5. Copper Soldering: Tin edges of uncoated sheets, using solder for copper.

3.2 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 riveted and soldered joints or 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 apart. Install expansion-joint caps.

C. Downspouts: Join sections with 1-1/2-inch telescoping joints. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately 60 inches o.c.

D. Splash Pans: Install where downspouts discharge on low-slope roofs. Set in asphalt roofing cement or elastomeric sealant compatible with the substrate.

E. 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.

F. Conductor Heads: Anchor securely to wall, with elevation of conductor head rim at minimum of 1 inch below scupper or gutter discharge.

G. Expansion-Joint Covers: Install expansion-joint covers at locations and of configuration indicated. Lap joints minimum of 4 inches in direction of water flow.

3.3 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 ES-1 testing 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 ES-1 testing 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 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 counterflashing 4 inches over base flashing. Lap counterflashing joints minimum of 4 inches.

F. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric or butyl sealant and clamp flashing to pipes that penetrate roof.

3.4 WALL FLASHING INSTALLATION

A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

B. Through-Wall Flashing: Installation of through-wall flashing is specified in Section 042000 "Unit Masonry."

C. Reglets: Installation of reglets is specified in Section 033000 "Cast-in-Place Concrete." Section 042000 "Unit Masonry."

D. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings.

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 manufacturers written installation instructions.

END OF SECTION 07 62 00

SECTION 077200 - ROOF ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Equipment supports.
2. Roof hatches.
3. Snow Guards

1.2 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

B. WARRANTY

Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finishes or replace roof accessories that show evidence of deterioration of factory-applied finishes within 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 METAL MATERIALS

A. Aluminum Extrusions and Tubes: ASTM B 221, manufacturer's standard alloy and temper for type of use, finished to match assembly where used, otherwise mill finished.

B. Stainless-Steel Sheet and Shapes: ASTM A 240/A 240M or ASTM A 666, Type 304.

C. Steel Shapes: ASTM A 36/A 36M, hot-dip galvanized according to ASTM A 123/A 123M unless otherwise indicated.

2.2 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.

B. Wood Nailers: Softwood lumber, pressure treated with waterborne preservatives for aboveground use, acceptable to authorities having jurisdiction, containing no arsenic or chromium, and complying with AWPA C2; not less than 1-1/2 inches thick.

C. Security Grilles: 3/4-inch diameter, ASTM A 1011/A 1011M steel bars spaced 6 inches o.c. in one direction and 12 inches o.c. in the other; factory finished with manufacturer's or fabricator's standard, universal shop primer compatible with substrate and field-applied finish paint system indicated.

D. Fasteners: Roof accessory manufacturer's recommended fasteners suitable for application and metals being fastened. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners.

E. Sealants: As recommended by roof accessory manufacturer for installation indicated.

2.3 EQUIPMENT SUPPORTS

A. Equipment Supports: Internally reinforced metal equipment supports capable of supporting superimposed live and dead loads, including equipment loads and other construction indicated on Drawings; with welded or mechanically fastened and sealed corner joints, stepped integral metal cant raised the thickness of roof insulation, and integrally formed deck-mounting flange at perimeter bottom.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, the following:

    a. AES Industries, Inc.
    b. Curbs Plus, Inc.
    c. Milcor Inc.; Commercial Products Group of Hart & Cooley, Inc.

B. Material: Aluminum-zinc alloy-coated steel sheet, 0.052 inch – 16 ga. thick.

1. Color: As selected by Architect from manufacturer's full range.

C. Construction:

1. Factory-installed continuous wood nailers 3-1/2 inches wide at tops of equipment supports.
2. Metal Counterflashing: Manufacturer's standard, removable, fabricated of same metal and finish as equipment support.
3. On ribbed or fluted metal roofs, form deck-mounting flange at perimeter bottom to conform to roof profile.
4. Fabricate equipment supports to minimum height of 12 inches unless otherwise indicated.
5. Sloping Roofs: Where roof slope exceeds 1:48, fabricate each support with height to accommodate roof slope so that tops of supports are level with each other. Equip supports with water diverters or crickets on sides that obstruct water flow.
6. Security Grille: Provide where indicated.

2.4 ROOF HATCH

A. Roof Hatches: Metal roof-hatch units with lids and insulated single-walled curbs, welded or mechanically fastened and sealed corner joints, continuous lid-to-curb counterflashing and weathertight perimeter gasketing, stepped integral metal cant raised the thickness of roof insulation, and integrally formed deck-mounting flange at perimeter bottom.

1. Subject to compliance with requirements, provide Bilco metal roof scuttle type “NB”

B. Type and Size: Single-leaf lid, 36 by 54 inches.

C. Loads: Minimum 40-lbf/sq. ft. external live load and 20-lbf/sq. ft. internal uplift load.

D. Hatch Material: Aluminum-zinc alloy-coated steel sheet, 0.079 inch thick.

1. Color: As selected by Architect from manufacturer's full range.

E. Construction:

1. Insulation: Glass-fiber board.
2. Hatch Lid: Opaque, insulated, and double walled, with manufacturer's standard metal liner of same material and finish as outer metal lid.
3. Curb Liner: Manufacturer's standard, of same material and finish as metal curb.
4. On ribbed or fluted metal roofs, form flange at perimeter bottom to conform to roof profile.
5. Fabricate curbs to minimum height of 12 inches unless otherwise indicated.

F. Hardware: Galvanized-steel spring latch with turn handles, butt- or pintle-type hinge system, and padlock hasps inside and outside.

1. Provide two-point latch on lids larger than 84 inches.
2. Provide remote-control operation.

G. Safety Railing System: Roof-hatch manufacturer's standard system including rails, clamps, fasteners, safety barrier at railing opening, and accessories required for a complete installation; attached to roof hatch and complying with 29 CFR 1910.23 requirements and authorities having jurisdiction.

H. Ladder-Assist Post: Roof-hatch manufacturer's standard device for attachment to roof-access ladder. Post locks in place on full extension; release mechanism returns post to closed position.

1. Safety post shall be “Model 1 Ladder Up Safety Post by Bilco. In areas within 50 miles of the coast, use Model 2 Ladder Up Safety Post (hot dipped galvanized with special alloy spring) by Bilco.

2.5 PAD-TYPE SNOW GUARDS

A. Seam-Mounted Metal Snow Guard Pads:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Alpine SnowGuards; a division of Vermont Slate & Copper Services, Inc., Model # ASG33G-U
   b. Or equal product by Berger Building Products.

2. Material and Finish: Cast aluminum; mill.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Verify dimensions of roof openings for roof accessories. Install roof accessories according to manufacturer's written instructions.

1. Install roof accessories level, plumb, true to line and elevation, and without warping, jogs in alignment, excessive oil canning, buckling, or tool marks.
2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.
3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.
4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

1. Coat concealed side of uncoated aluminum, stainless-steel roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing roof accessories directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet, or install a course of polyethylene sheet.

C. Security Grilles: Weld bar intersections and, using tamper-resistant bolts, attach the ends of bars to structural frame or primary curb walls.

D. Seal joints with sealant as required by roof accessory manufacturer.

E. Install snow guards according to manufacturer's written instructions. Space rows as recommended by manufacturer.

1. Attachment for Standing-Seam Metal Roofing:

a. Do not use fasteners that will penetrate metal roofing, or fastening methods that void metal roofing finish warranty.

3.2 REPAIR AND CLEANING

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A 780.

B. Touch up factory-primed surfaces with compatible primer ready for field painting according to Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

C. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 07 72 00

SECTION 07 92 00 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Silicone joint sealants.
2. Urethane joint sealants.
3. Latex joint sealants.
4. Preformed joint sealants.

1.2 WARRANTY

A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer's standard form in which joint-sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

B. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

C. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

2.2 SILICONE JOINT SEALANTS

A. Mildew-Resistant Silicone Joint Sealant: ASTM C 920.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. BASF Building Systems.
b. Pecora Corporation.
c. Tremco Incorporated.

2. Type: Single component (S).
3. Grade: Pourable (P) or nonsag (NS).
4. Class: 100/50.
5. Uses Related to Exposure: Nontraffic (NT).

2.3 URETHANE JOINT SEALANTS

A. Urethane Joint Sealant: ASTM C 920.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. BASF Building Systems.
b. Pecora Corporation.
c. Tremco Incorporated.

2. Type: Single component (S).
3. Grade: Pourable (P) or nonsag (NS).
4. Class: 100/50.
5. Uses Related to Exposure: traffic (T).

2.4 LATEX JOINT SEALANTS

A. Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. BASF Building Systems.
b. Pecora Corporation.
c. Tremco Incorporated.

2.5 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.

2.6 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

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.

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 of joint sealants.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.2 INSTALLATION

A. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

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.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

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 Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.

F. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.3 JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces.

1. Joint Locations:

a. Isolation and contraction joints in cast-in-place concrete slabs.

b. Joints between different materials listed above.

2. Joint Sealant: Urethane.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

B. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Locations:

a. Construction joints in cast-in-place concrete.
b. Joints between plant-precast architectural concrete units.
c. Control and expansion joints in unit masonry.
d. Joints in exterior insulation and finish systems.
e. Joints between metal panels.
f. Joints between different materials listed above.
g. Perimeter joints between materials listed above and frames of doors windows and louvers.
h. Control and expansion joints in ceilings and other overhead surfaces.

2. Joint Sealant: Urethane.
3. Joint-Sealant Color: to match adjacent materials unless noted otherwise on the drawings.

C. Joint-Sealant Application: Interior joints in horizontal traffic surfaces.

1. Joint Locations:

a. Isolation joints in cast-in-place concrete slabs.
b. Control and expansion joints in tile flooring.

2. Joint Sealant:

a. Euco QUIKjoint UVR at exposed gray concrete surfaces
b. Urethane at slabs to receive decorative finishes

3. Joint-Sealant Color: to match adjacent materials unless noted otherwise on the drawings.

D. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Locations:

a. Control and expansion joints on exposed interior surfaces of exterior walls.
b. Perimeter joints of exterior openings where indicated.
c. Vertical joints on exposed surfaces of interior unit masonry, concrete walls and partitions.

d. Perimeter joints between interior wall surfaces and frames of interior doors and windows.

2. Joint Sealant: Latex.
3. Joint-Sealant Color: to match adjacent materials unless noted otherwise on the drawings.

E. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Sealant Location:

a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
b. Tile control and expansion joints where indicated.

2. Joint Sealant: Silicone.
3. Joint-Sealant Color: to match adjacent materials unless noted otherwise on the drawings.

END OF SECTION 07 92 00

SECTION 08 11 13 - HOLLOW METAL DOORS AND FRAMES – (NATIONAL ACCOUNT)

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.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Ceco Door Products; an Assa Abloy Group company.
2. Republic Doors and Frames.
3. Steelcraft; an Ingersoll-Rand company.

2.2 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. Face: Uncoated, cold-rolled steel sheet, minimum thickness of 0.075 inch.
d. Edge Construction: Model 1
e. Core: Manufacturer's standard.

3. Frames:

a. Materials: Uncoated, steel sheet, minimum thickness of 0.053 inch.
b. Construction: Full profile welded.

4. Exposed Finish: Prime.

2.3 EXTERIOR HOLLOW-METAL DOORS AND FRAMES

A. Extra-Heavy-Duty Doors and Frames: SDI A250.8, Level 4.

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: Uncoated, cold-rolled steel sheet, minimum thickness of 0.075 inch
d. Edge Construction: Model 1
e. Core: Steel stiffened

3. Frames:

a. Materials: minimum thickness of 0.053 inch.
b. Construction: Full profile welded.

4. Exposed Finish: Prime.

2.4 FRAME ANCHORS

A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch 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, 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.

2.5 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. 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.

D. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

E. Power-Actuated Fasteners in Concrete: From corrosion-resistant materials.

F. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.

G. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing).

H. Glazing: Section 088000 "Glazing."

2.6 FABRICATION

A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Hollow-Metal Doors:

1. Exterior Doors: Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape.

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. 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.
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) Two anchors per jamb up to 60 inches high.
        2) Three anchors per jamb from 60 to 90 inches high.
        3) Four anchors per jamb from 90 to 120 inches high.
        4) Four anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 120 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) Three anchors per jamb up to 60 inches high.
        2) Four anchors per jamb from 60 to 90 inches high.
        3) Five anchors per jamb from 90 to 96 inches high.
        4) Five anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.

    c. Compression Type: Not less than two anchors in each frame.
    d. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.

6. Door Silencers: Except on weather-stripped 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 butted or mitered hairline joints.

1. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
2. Provide loose stops and moldings on inside of hollow-metal work.

2.7 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.

1. Shop Primer: SDI A250.10.

2.8 ACCESSORIES

A. Louvers: Provide 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.

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 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. Install frames with removable stops located on secure side of opening.

b. Install door silencers in frames before grouting.
c. Remove temporary braces necessary for installation only after frames have been properly set and secured.
d. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
e. Field apply bituminous coating to backs of frames that will be filled with grout containing antifreezing agents.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.

a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
5. Concrete Walls: Solidly fill space between frames and concrete with mineral-fiber insulation.
6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
7. In-Place Metal or Wood-Stud Partitions: Secure slip-on drywall frames in place according to manufacturer's written instructions.
8. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

a. Squareness: Plus or minus 1/16 inch, 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: 5/8 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.

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.

D. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 08 11 13

SECTION 087111 - DOOR HARDWARE (DESCRIPTIVE SPECIFICATION) – (NATIONAL ACCOUNT)

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Mechanical door hardware for the following:

a. Swinging doors.

B. Products furnished, but not installed, under this Section include the products listed below. Coordinating and scheduling the purchase and delivery of these products remain requirements of this Section.

1. Pivots thresholds weather stripping and lock cylinders to be installed under other Sections.
2. Permanent lock cores to be installed by Owner.

1.2 ACTION SUBMITTALS

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

B. Other Action Submittals:

1. Door Hardware Schedule: Prepared by or under the supervision of Installer, detailing fabrication and assembly of door hardware, as well as installation procedures and diagrams. Coordinate final door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

a. Format: Use same scheduling sequence and format and use same door numbers as in the Contract Documents.
b. Content: Include the following information:

1) Identification number, location, hand, fire rating, size, and material of each door and frame.
2) Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.
3) Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.

2. Keying Schedule: Prepared by or under the supervision of Installer, detailing Owner's final keying instructions for locks.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and an Architectural Hardware Consultant who is available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying. Installer to have a minimum of 2 years of experience.

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 follows:

1. For door hardware, an Architectural Hardware Consultant (AHC).

C. 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.

D. Accessibility Requirements: For door hardware on doors in an accessible route, comply with ICC/ANSI A117.1.

1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.
2. Comply with the following maximum opening-force requirements:

    a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf applied perpendicular to door.
    b. Sliding or Folding Doors: 5 lbf applied parallel to door at latch.
    c. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.

3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch high.
4. Adjust door closer sweep periods so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.

E. Code Compliance: All hardware listed or furnished shall meet the requirements of Federal, State and Local codes having jurisdiction over this installation. Any item furnished or installed that does not meet code requirements, shall be removed and proper items substituted at no additional cost or expense to the owner.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

1.5 WARRANTY

A. Special Warranty: Manufacturer's standard form in which 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.

a. Exit Devices: Two years from date of Substantial Completion.
b. Manual Closers: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. Provide door hardware for each door as scheduled in Part 3 "Door Hardware Schedule" Article to comply with requirements in this Section.

1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated.
2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.

B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 3 "Door Hardware Schedule" Article. Products are identified by descriptive titles corresponding to requirements specified in Part 2.

2.2 HINGES

A. Hinges: BHMA A156.1. Provide template-produced hinges for hinges installed on hollow-metal doors and hollow-metal frames.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:

a. Stanley Commercial Hardware; Div. of The Stanley Works.

B. Plain-Bearing Hinges: Grade 3 (standard weight).

1. Mounting: Full mortise (butts).
2. Base and Pin Metal: Brass with stainless-steel pin body and brass protruding heads.
3. Pins: Nonremovable.
4. Tips: Flat button.
5. Corners: Square.

2.3 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-inchbolt throw.

C. Lock Backset: 2-3/4 inches, unless otherwise indicated.

D. Lock Trim:

1. Levers: Cast.
2. Escutcheons (Roses): Cast.
3. Dummy Trim: Match lever lock trim and escutcheons.
4. Operating Device: Lever with escutcheons (roses).

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.

F. Bored Locks: BHMA A156.2; Grade 1; Series 4000.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by the following:

a. S. Parker Hardware.

G. Mortise Locks: BHMA A156.13; Operational Grade 1; stamped steel case with steel or brass parts; Series 1000.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. S. Parker Hardware.

2.4 EXIT DEVICES AND AUXILIARY ITEMS

A. Exit Devices and Auxiliary Items: BHMA A156.3.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by the following:

a. Von Duprin; an Ingersoll-Rand company.

B. Panic Exit Devices: Listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.

2.5 LOCK CYLINDERS

A. Lock Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by the following:

a. S. Parker Hardware.

B. Standard Lock Cylinders: BHMA A156.5; Grade 1; permanent cores that are interchangeable, removable; face finished to match lockset.

1. Number of Pins: Six.
2. Type: Mortise type.

C. Construction Master Keys: Provide cylinders with feature that permits voiding of construction keys without cylinder removal. Provide 10 construction master keys.

D. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide 10 construction master keys.

2.6 KEYING

A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, Appendix A. Incorporate decisions made in keying conference.

1. Front entrance/exit doors shall be keyed alike in set #1.
2. All other exterior doors shall be keyed alike in set #2
3. and interior doors shall be keyed alike in set #3.
4. Contractor shall provide the owner with six (6) keys per lockset.

2.7 OPERATING TRIM

A. Operating Trim: BHMA A156.6; stainless steel, unless otherwise indicated.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by the following:

a. IVES Hardware; An Ingersoll-Rand Company: trims, stops.
b. Lindstrom: push plates, pull handles

B. Flat Push Plates: 0.050 inch 1/8 inch thick, 4 inches wide by 16 inches high with square corners and beveled edges; secured with exposed screws.

C. Straight Door Pulls: With minimum clearance of 1-1/2 inches from face of door.

1. Type: 3/4-inch constant-diameter pull.
2. Mounting: Back to back with threaded sleeves.
3. Overall Length: 4 inches wide by 16 inches high

2.8 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 recommendations 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. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by the following:

a. SARGENT Manufacturing Company; an ASSA ABLOY Group company. Series 281

B. Surface Closer with Cover: Grade 1; Modern Type with mechanism enclosed in cover.

1. Mounting: Bracket.
2. Type: Regular arm.
3. Backcheck: Adjustable, effective between 60 and 85 degrees of door opening.
4. Cover Material: Plastic.
5. Closing Power Adjustment: At least 15 percent more than minimum tested value.

2.9 THRESHOLDS

A. Thresholds: BHMA A156.21; fabricated to full width of opening indicated.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:

a. Pemko Manufacturing Co.; an ASSA ABLOY Group company.

B. Saddle Thresholds:

1. Type: Fluted top, barrier free.
2. Base Metal: Aluminum.

2.10 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. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:

a. IVES Hardware; an Ingersoll-Rand company.

B. Kick Plates: 10 inches high by door width with allowance for frame stops.

2.11 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.

1. Spacers or Sex Bolts: For through bolting of hollow-metal doors.

2.12 FINISHES

A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.

B. 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.

C. 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.

1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

D. 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.

E. Lock Cylinders: Install construction cores to secure building and areas during construction period.

1. Replace construction cores with permanent cores as directed by Owner.

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. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

I. Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.2 DOOR HARDWARE SCHEDULE

A. Door Package Components:

HW-01 (key set #1)
Hardware by door supplier and
(1) Lockset: 17102XAR

HW-02
(1 ½ pair) Butt Hinge: FBB179-USP-4 ½ x 4 ½
(1) Closer: EN-281-0-TB
(2) Sweep: PEMKO #18100CNB84 (36”)
(1) Weather-strip: 332-AR-3070
(1) Kick Plate: 10” x 32”

HW-03
(1 ½ pair) Butt Hinge: FBB179-USP-4 ½ x 4 ½
(1) Closer: EN-281-0-TB
(1) Sweep: PEMKO #18100CNB84 (36”)
(1) Weather-strip: 332-AR-3070
(1) Kick Plate: 10” x 32”

HW-04
- (1 ½ pair) Butt Hinge: FBB179-USP-4 ½ x 4 ½
- (1) Closer: EN-281-0-TB
- (1) Sweep: PEMKO #18100CNB84 (48”)
- (1) Weather-strip: 332-AR-4070
- (1) Kick Plate: 10” x 44”

HW-05
- (1 ½ pair) Butt Hinge: FBB179-USP-4 ½ x 4 ½
- (1) Push: 100 – 4x16 – US32D
- (1) Pull: 100xG3 – 4x16 – US32D
- (1) Closer: EN-281-0-TB
- (1) Stop: 442B26D
- (1) Kick Plate: 10” x 26”
- (3) Silencer: 307D

HW-06 (key set #3)
- (1 ½ pair) Butt Hinge: FBB179-USP-4 ½ x 4 ½
- (1) Push: 100 – 4x16 – US32D
- (1) Pull: 100xG3 – 4x16 – US32D
- (1) Lockset: 821621C
- (1) Closer: EN-281-0-TB
- (1) Stop: 442B26D
- (1) Kick Plate: 10” x 32”
- (3) Silencer: 307D

HW-07 Overhead Coiling Doors (see section 08 33 23)

HW-08
- (1 ½ pair) Butt Hinge: FBB179-USP-4 ½ x 4 ½
- (1) Push: 100 – 4x16 – US32D
- (1) Pull: 100xG3 – 4x16 – US32D
- (1) Closer: EN-281-0-TB
- (1) Stop: 442B26D
- (1) Kick Plate: 10” x 32”
- (3) Silencer: 307D
- (1) Kick down holder: FS555 SP28

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HW-09 (key set #3)
- (1 ½ pair) Butt Hinge: FBB179-USP-4 ½ x 4 ½
- (1) Lockset: L7160P26D(PRIVACY LEVERSET)
- (1) Closer: EN-281-0-TB
- (1) Sweep: PEMKO #18100CNB84 (24”)
- (1) Weather Strip: 332-AR-2070
- (3) Silencer: 307D
- (1) Kick Plate: 10” x 20”

HW-10
- (1 ½ pair) Butt Hinge: FBB179-USP-4 ½ x 4 ½
- (1) Push: 100 – 4x16 – US32D
- (1) Pull: 100xG3 – 4x16 – US32D
- (1) Closer: EN-281-H-TB
- (1) Wall Bumper: 408 1/2
- (1) Kick Plate: 10” x 32”

(3) Silencer: 307D
(1) Sign: “LOUNGE” – Black with White Letters with wheel chair accessible indication and Braille (lounge only)
(1) Kick down holder: FS555 SP28

HW-10A
(1 ½ pair) Butt Hinge: FBB179-USP-4 ½ x 4 ½
(1) Push: 100 – 4x16 – US32D
(1) Pull: 100xG3 – 4x16 – US32D
(1) Closer: EN-281-H-TB
(1) Wall Bumper: 408 1/2
(1) Kick Plate: 10” x 32”
(3) Silencer: 307D
(1) Sign: “MEN” - Black with White Letters with wheel chair accessible indication and Braille (men’s room only)
(1) Kick down holder: FS555 SP28

HW-10B
(1 ½ pair) Butt Hinge: FBB179-USP-4 ½ x 4 ½
(1) Push: 100 – 4x16 – US32D
(1) Pull: 100xG3 – 4x16 – US32D
(1) Closer: EN-281-H-TB
(1) Wall Bumper: 408 1/2
(1) Kick Plate: 10” x 32”
(3) Silencer: 307D
(1) Sign: “WOMEN” – Black with White Letters with wheel chair accessible indication and Braille (women’s room only)
(1) Kick down holder: FS555 SP28

HW-10C
(1 ½ pair) Butt Hinge: FBB179-USP-4 ½ x 4 ½
(1) Privacy Lock: SL 8160P
(1) Closer: EN-281-H-TB
(1) Wall Bumper: 408 1/2
(1) Kick Plate: 10” x 32”
(3) Silencer: 307D
(1) Sign: “FAMILY” - Black with White Letters with wheel chair accessible indication and Braille (family room only)
(1) Kick down holder: FS555 SP28

HW-11 (key set #3)
(1 ½ pair) Butt Hinge: FBB179-USP-4 ½ x 4 ½
(1) Lockset: XL8160D26D1C(STOREROOM LEVERSET)
(1) Closer: EN-281-0-TB
(1) Stop: 442B26D
(1) Kick Plate: 10” x 32”

HW-12 (key set #3)
(1 ½ pair) Spring Hinge: 2060-USP-4 ½ x 4 ½
(1) Lockset: XL8160D26D1C (STOREROOM LEVERSET)
(1) Stop: 438PA28
(1) Silencer: 307D
(1) Kick Plate: 10” x 32”

H12_A (key set #3)
(1 ½ pair) Spring Hinge: 2060-USP-4 ½ x 4 ½
(1) Lockset: L7160N26D (PASSAGE LEVERSET)
(1) Kickdown Holder: FS555 SP28
(1) Silencer: 307D
(1) Kick Plate: 10” x 32”

H12_B (key set #3)
(1 ½ pair) Spring Hinge: 2060-USP-4 ½ x 4 ½
(1) Lockset: XL8160D26D1C (STOREROOM LEVERSET)
(1) Kickdown Holder: FS555 SP28
(1) Silencer: 307D
(1) Kick Plate: 10” x 32”

HW-13
(1) Eliason SCP-7 or Chase Duras SC-3000

HW-14
(2) Eliason SCP-7 or Chase Duras SC-3000

HW-15
(1) Eliason LWP-3 or Chase Duras SD-2000

HW-16
(1 ½ pair) Butt Hinge: FBB179-USP-4 ½ x 4 ½
(1) Lockset: SL8160EXIT26D1C(EXIT LOCK)
(1) Closer: EN-281-0-TB
(1) Sweep: PEMKO #18100CNB84 (48”)
(1) Weather Strip: 332-AR-4070
(1) Kick Plate: 10” x 44”

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HW-17 (key set #3)
(3 pair) Butt Hinge: FBB179-USP-4 ½ x 4 ½
(1) Lockset: L7160N26D(PASSAGE LEVERSET)
(1) Closer: EN-281-0-TB
(2) Sweep: PEMKO #18100CNB84 (36”)
(2) Weather Strip: 332-AR-3670
(4) Silencer: 307D
(2) Kick Plate: 10” x 32”
(2) Surface Bolt
(1) Astragal: Flat 8’-0”

HW-18 (key set #3)
(1 pair) Butt Hinge: FBB179-USP_4 ½ x 4 ½
(1) Lockset: 82162LC
(1) Closer: EN-281-0-TB
(1) Weatherstrip: 332-AR-4070

B. Remodel Door Package Components:

HW-19
(1) Continuous Hinge: "Roton" by Hager model 780-057
(1) Closer: EN-281-H-TB

END OF SECTION 08 71 11

SECTION 08 80 00 - GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:

1. Windows.
2. Doors.
3. Storefront framing.

B. Related Sections:

1. Metal Composite Material Wall Panels for opaque glazing panels as indicated on plans.

1.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design glass, including comprehensive engineering analysis according to ICC's 2003 International Building Code by a qualified professional engineer, using the following design criteria:

1. Design Wind Pressures: As indicated on Drawings. All stores located within 30 miles from the coast shall be designed as hurricane rated system.
2. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.

1.3 QUALITY ASSURANCE

A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
2. GANA Publications: GANA's "Laminated Glazing Reference Manual" and GANA's "Glazing Manual."

B. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

1.4 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form in which coated-glass manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.

1. Warranty Period: 10 years from date of Substantial Completion.

B. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form in which insulating-glass manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS, GENERAL

A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.

B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.

C. Windborne-Debris-Impact Resistance: Provide exterior glazing that passes basic-protection testing requirements in ASTM E 1996 for Wind zone specified for building location when tested according to ASTM E 1886. Test specimens shall be no smaller in width and length than glazing indicated for use on the Project and shall be installed in same manner as glazing indicated for use on the Project.

1. Large-Missile Test: For glazing located within 30 feet of grade.

2. Small-Missile Test: For glazing located more than 30 feet above grade.

D. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:

1. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F.
2. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
3. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.2 GLASS PRODUCTS

A. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.

B. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicated.

C. Uncoated Tinted Float Glass: Class 2, complying with other requirements specified.

1. Basis-of-Design Product: Subject to compliance with requirements, provide PPG or comparable product by one of the following:

a. AFG Industries, Inc.;
b. Guardian Industries Corp
c. Pilkington North America;

2. Tint Color: indicated on the drawings.

D. Reflective-Coated Vision Glass: ASTM C 1376, coated by vacuum deposition (sputter-coating) process, and complying with other requirements specified.

1. Basis-of-Design Product: Subject to compliance with requirements, provide:

a. Pilkington North America; Mirropane T.M.

2. Kind: Kind CV (coated vision glass).
3. Coating Color: Silver.
4. Glass: Clear float.
5. Visible Light Transmittance: 27 percent minimum.
6. Outdoor Visible Reflectance: 37 percent maximum.

E. Silicone-Coated Spandrel Glass: ASTM C 1048, Condition C, Type I, Quality-Q3, and complying with other requirements specified.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Guardian Glass or comparable product by one of the following:

a. AFG Industries, Inc.;
b. PPG
c. Pilkington North America;

2. Tint Color: indicated on the drawings.
3. Silicone Coating Color: As selected by Architect from manufacturer's full range.

2.3 LAMINATED GLASS

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. Vitro America, (662)226-5551, with either Salfex, Solutia, or Dupont inter-layers or Coastal Glass Distributors, (866)695-5404, with Uvekol inter-layers.

B. Laminated Glass: ASTM C 1172, and complying with testing requirements in 16 CFR 1201 for Category II materials, and with other requirements specified. 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 or cast-in-place and cured-transparent-resin interlayer to comply with interlayer manufacturer's written recommendations.
2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
3. Interlayer Color: Clear unless otherwise indicated.

C. Windborne-Debris-Impact-Resistant Laminated Glass: ASTM C 1172, and complying with testing requirements in 16 CFR 1201 for Category II materials, with "Windborne-Debris-Impact Resistance" Paragraph in "Glass Products, General" Article, and with other requirements specified. 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 one of the following to comply with interlayer manufacturer's written recommendations:

a. Polyvinyl butyral interlayer.
b. Polyvinyl butyral interlayers reinforced with polyethylene terephthalate film.
c. Ionoplast interlayer.
d. Cast-in-place and cured-transparent-resin interlayer.
e. Cast-in-place and cured-transparent-resin interlayer reinforced with polyethylene terephthalate film.

2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
3. Interlayer Color: Clear unless otherwise indicated.

2.4 INSULATING GLASS

A. Basis-of-Design Product: Subject to compliance with requirements, provide PPG (as indicated on plans) or comparable product by one of the following:

1. AFG Industries, Inc.;
2. Guardian Industries Corp
3. Pilkington North America;

B. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190, and complying with other requirements specified.

1. Sealing System: Dual seal.
2. Spacer: Manufacturer's standard spacer material and construction.

2.5 GLAZING GASKETS

A. Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain watertight seal, made from one of the following:

1. Neoprene complying with ASTM C 864.
2. EPDM complying with ASTM C 864.
3. Silicone complying with ASTM C 1115.
4. Thermoplastic polyolefin rubber complying with ASTM C 1115.

B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned neoprene EPDM silicone or thermoplastic polyolefin rubber gaskets complying with ASTM C 509, Type II, black; of profile and hardness required to maintain watertight seal.

1. Application: Use where soft compression gaskets will be compressed by inserting dense compression gaskets on opposite side of glazing or pressure applied by means of pressure-glazing stops on opposite side of glazing.

2.6 GLAZING SEALANTS

A. General:

1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.

3. Sealants used inside the weatherproofing system, shall have a VOC content of not more than 250 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
4. Colors of Exposed Glazing Sealants: Match Architect's samples 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.

2.7 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.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:

1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.8 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).

2.9 MONOLITHIC-GLASS TYPES

A. Glass Type: Clear fully tempered float glass.

1. Thickness: 6.0 mm.

2. Provide safety glazing labeling.

B. Glass Type: Tinted fully tempered float glass.

1. Thickness: 6.0 mm.
2. Provide safety glazing labeling.

C. Glass Type: Silicone-coated spandrel glass, fully tempered float glass.

1. Thickness: 6.0 mm.
2. Coating Location: Second surface.

D. Glass Type: Ceramic-coated, laminated vision glass with two plies of fully tempered float glass.

1. Thickness of Each Glass Ply: 3.0 mm.
2. Interlayer Thickness: 0.030 inch (0.76 mm).
3. Coating Location: Second surface.
4. Provide safety glazing labeling.

2.10 LAMINATED-GLASS TYPES

A. Glass Type: Clear laminated glass with two plies of fully tempered float glass.

1. Thickness of Each Glass Ply: 3.0 mm.
2. Interlayer Thickness: 0.060 inch.
3. Provide safety glazing labeling.

B. Glass Type: Tinted laminated glass with two plies of fully tempered float glass with outer ply Class 2 (tinted) and inner ply Class 1 (clear).

1. Thickness of Each Glass Ply: 3.0 mm.
2. Interlayer Thickness: 0.060 inch.
3. Provide safety glazing labeling.

2.11 INSULATING-GLASS TYPES

A. Glass Type: Low-e-coated, clear insulating glass.

1. Overall Unit Thickness: 1 inch.
2. Thickness of Each Glass Lite: 6.0 mm.
3. Outdoor Lite: Fully tempered float glass or heat strengthened (see drawings).
4. Interspace Content: Air.
5. Indoor Lite: Fully tempered float glass or heat strengthened (see drawings).
6. Low-E Coating: Pyrolytic on second surface.
7. Visible Light Transmittance: 74% percent minimum.
8. Winter Nighttime U-Factor: .35 maximum.
9. Summer Daytime U-Factor: .35 maximum.

10. Solar Heat Gain Coefficient: .62 maximum.
11. Provide safety glazing labeling.

B. Glass Type: Low-e-coated, tinted insulating glass.

1. Overall Unit Thickness: 1 inch.
2. Thickness of Each Glass Lite: 6.0 mm.
3. Outdoor Lite: Tinted fully tempered float glass or heat strengthened (see drawings)
4. Interspace Content: Air.
5. Indoor Lite: Clear fully tempered float glass or heat strengthened (see drawings).
6. Low-E Coating: Pyrolytic on second surface.
7. Visible Light Transmittance: 37% percent minimum.
8. Winter Nighttime U-Factor: .35 maximum.
9. Summer Daytime U-Factor: .35 maximum.
10. Solar Heat Gain Coefficient: .40 maximum.
11. Provide safety glazing labeling.

2.12 INSULATING-LAMINATED-GLASS TYPES

A. Glass Type: Low-e-coated, clear insulating laminated glass.

1. Overall Unit Thickness: 1 inch.
2. Thickness of Outdoor Lite: 6.0 mm.
3. Outdoor Lite: Fully tempered float glass.
4. Interspace Content: Air.
5. Indoor Lite: Clear laminated glass with two plies of fully tempered float glass.
    a. Thickness of Each Glass Ply: 3.0 mm.
    b. Interlayer Thickness: 0.030 inch.
6. Low-E Coating: Pyrolytic on second surface.
7. Provide safety glazing labeling.

B. Glass Type: Low-e-coated, tinted, insulating laminated glass.

1. Overall Unit Thickness: 1 inch.
2. Thickness of Outdoor Lite: 6.0 mm.
3. Outdoor Lite: Tinted fully tempered float glass.
4. Interspace Content: Air.
5. Indoor Lite: Clear laminated glass with two plies of fully tempered float glass.
    a. Thickness of Each Glass Ply: 3.0 mm.
    b. Interlayer Thickness: 0.030 inch.
6. Low-E Coating: Pyrolytic on second surface.
7. Provide safety glazing labeling.

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. Adjust glazing channel dimensions as required by Project conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

G. Provide spacers for glass lites where length plus width is larger than 50 inches.

H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

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 and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. 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.

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.

C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

E. Install gaskets so they protrude past face of glazing stops.

3.4 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. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.

C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.

D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

END OF SECTION 08 80 00

SECTION 09 22 16 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Non-load-bearing steel framing systems for interior gypsum board assemblies.
2. Suspension systems for interior gypsum ceilings and soffits.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 FRAMING SYSTEMS

A. Steel Studs and Runners: ASTM C 645.

1. Minimum Base-Metal Thickness: 20 ga., unless otherwise indicated on drawings.
2. Depth: As indicated on drawings.

B. Slip-Type Head Joints: Where indicated, provide the following in thickness not less than indicated for studs and in width to accommodate depth of studs:

1. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes due to deflection of structure above.

a. Basis of Design Products: Subject to compliance with requirements, provide the following or equal product from another manufacturer:

1) Dietrich Metal Framing; SLP-TRK Slotted Deflection Track.

C. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.

1. Minimum Base-Metal Thickness: .0598 inch (16 ga.) unless otherwise indicated on the drawings.

D. Cold-Rolled Channel Bridging: Steel, .0538 inch (16 ga.) minimum base-metal thickness, with minimum 1/2-inch- wide flanges, unless otherwise indicated on drawings.

1. Depth: 1-1/2 inches.
2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 18 ga.,- thick, galvanized steel.

E. Hat-Shaped, Rigid Furring Channels: ASTM C 645.

1. Minimum Base-Metal Thickness: .0329 inch (20 ga.)
2. Depth: As indicated on Drawings.

F. Cold-Rolled Furring Channels: .0538 inch (16 ga.) uncoated-steel thickness, with minimum 1/2-inch- wide flanges, unless otherwise indicated on drawings.

1. Depth: As indicated on Drawings.
2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum uncoated-steel thickness of 0.033 inch.
3. 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.

2.2 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. Powder-Actuated Fasteners: Capable of sustaining, a load equal to 10 times that imposed as determined by ASTM E 1190.

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 0.053 inch and minimum 1/2-inch- wide flanges.

1. Depth: 2-1/2 inches.

F. Furring Channels (Furring Members):

1. Cold-Rolled Channels: 16 ga. 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: .0329 (20 ga.), unless otherwise indicated on drawings.
b. Depth: As indicated on Drawings.

3. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch deep.

a. Minimum Base-Metal Thickness: .0329 inch (20 ga.)

2.3 AUXILIARY MATERIALS

A. 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 asphalt saturated organic felt or foam gasket.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Installation Standard: ASTM C 754.

1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.

B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, signage, or similar construction.

C. Install bracing at terminations in assemblies.

D. 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.

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 penetrating 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 unless otherwise indicated on drawings.
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.

E. Direct Furring:

1. Screw to wood framing.
2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.

F. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

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.

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, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
3. Do not attach hangers to steel roof deck.
4. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
5. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
6. Do not connect or suspend steel framing from ducts, pipes, or conduit.

D. 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 09 22 16

SECTION 09 29 00 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior gypsum board.
2. Exterior gypsum board for ceilings and soffits.

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 INTERIOR GYPSUM BOARD

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Georgia-Pacific Gypsum LLC.
2. USG Corporation.

B. Gypsum Wallboard: ASTM C 1396/C 1396M.

1. Thickness: 1/2 inch.
2. Long Edges: Tapered.

C. Gypsum Board, Type X: ASTM C 1396/C 1396M.

1. Thickness: 5/8 inch. (3/4 hr. fire rating)
2. Long Edges: Tapered.

D. Flexible Gypsum Board: ASTM C 1396/C 1396M. Manufactured to bend to fit radii and to be more flexible than standard regular-type gypsum board of same thickness.

1. Thickness: 1/4 inch.
2. Long Edges: Tapered.

E. Gypsum Ceiling Board: ASTM C 1396/C 1396M.

1. Thickness: 1/2 inch.
2. Long Edges: Tapered.

2.3 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, provide products by one of the following:

a. Georgia-Pacific Gypsum LLC.
b. USG Corporation.

2. Core: As indicated.

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. Products: Subject to compliance with requirements, provide one of the following:

a. Georgia-Pacific Gypsum LLC; Dens-Glass Gold.
b. USG Corporation; Securock Glass Mat Sheathing.

2. Core: As indicated.

2.4 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.

B. Exterior Trim: ASTM C 1047.

1. Material: Hot-dip galvanized steel sheet, plastic, or rolled zinc.

C. Aluminum Trim: ASTM B 221, Alloy 6063-T5.

2.5 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.

2.6 AUXILIARY MATERIALS

A. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

B. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

C. Thermal Insulation: As specified in Section 072100 "Thermal Insulation."

D. Vapor Retarder: As specified in Section 072100 "Thermal Insulation."

PART 3 - EXECUTION

3.1 APPLYING AND FINISHING PANELS

A. Comply with ASTM C 840.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. 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. Install 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.

1. Aluminum Trim: Install in locations indicated on Drawings.
2. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.

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.
3. 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 09 91 23 "Interior Painting."

H. Protect adjacent surfaces from drywall compound and texture finishes and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

I. Remove and replace panels that are wet, moisture damaged, and mold damaged.

END OF SECTION 09 29 00

SECTION 09 30 00 - TILING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Quarry tile
2. Ceramic tile
3. Tile backing panels

PART 2 - PRODUCTS

2.1 TILE PRODUCTS

A. ANSI Ceramic Tile Standard: Provide Standard grade tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.

B. Tile Type: Unglazed square-edged quarry tile.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Daltile; Division of Dal-Tile International Inc. – Terrie Miller (terrie.miller@daltile.com) - Daltile National Account Desk (877) 556-5728 (national.accounts@daltile.com)

2. Face Size: 6 by 6 inches.
3. Thickness: 1/2 inch.
4. Wearing Surface: Abrasive aggregate embedded in surface.
5. Finish: Mat, clear glaze.
6. Tile Color and Pattern: As indicated on the drawings
7. Grout Color: As indicated on the drawings
8. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:

a. Base: Coved with surface bullnose top edge, face size 6 by 6 inches.
b. Wainscot Cap: Surface bullnose, face size 6 by 6 inches.

C. Tile Type: Glazed wall tile.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Daltile; Division of Dal-Tile International Inc.

2. Module Size: as shown on drawings.
3. Thickness: as shown on drawings
4. Face: as shown on drawings
5. Finish: as shown on drawings
6. Tile Color and Pattern: As shown on drawings
7. Grout Color: As shown on drawings
8. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:

   a. Base: as shown on drawings
   b. Wainscot Cap: as shown on drawings
   c. External Corners for Thin-Set Mortar Installations: Bullnose shape, same size as adjoining flat tile.
   d. Internal Corners: Field-butted square corners. For coved base and cap use angle pieces designed to fit with stretcher shapes.

2.2 TILE BACKING PANELS

A. Glass-Mat Interior Gypsum Backing Board: ASTM C 1658/C 1658M. With fiberglass mat laminated to both sides. Specifically designed for interior use. (0’-0” to 4’-0” a.f.f.)

1. Products: Subject to compliance with requirements, provide the following:

   a. Georgia-Pacific Gypsum LLC; DensShield Tile Backer.

2. Core: 1/2 inch
3. Long Edges: Tapered.
4. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

B. Water-Resistant Gypsum Backing Board: ASTM C 1396/C 1396M, with manufacturer's standard edges (4’-0” to ceiling)

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Georgia-Pacific Gypsum LLC.
   b. USG Corporation.

2. Core: 1/2”

2.3 SETTING MATERIALS

A. Portland Cement Mortar (Thickset) Installation Materials: ANSI A108.02

1. Setting bed for the floor shall be a mixture of Portland Cement and sand in 1:6 mixture. Portland Cement, ASTM C-150 Type 1, Sand, ASTM C-144, Water, clean and potable.

B. Dry-Set Portland Cement Mortar (Thin Set): ANSI A118.1.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Bonsal American; an Oldcastle company.
b. Summitville Tiles, Inc.

2. For wall applications, provide nonsagging mortar.

C. Organic Adhesive: ANSI A136.1, Type I.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Bonsal American; an Oldcastle company.
b. Summitville Tiles, Inc.

2.4 GROUT MATERIALS

A. Polymer-Modified Tile Grout: ANSI A118.7. For walls of the Deli/Bakery, Meat Prep, and Restrooms and other locations as indicated on the drawings.

1. Manufacturer and color: as indicated on the drawings

B. Water-Cleanable Epoxy Grout: ANSI A118.3. For walls at Meat Prep, Meat Storage, Meat Cooler, Restrooms, Deli/Bakery Area, Deli Bakery cooler, and Deli/Bakery Closet.

1. Manufacturer and color: as indicated on the drawings.

C. Custom Building Products, CEG-IG 100% Solids Industrial Grade Epoxy Grout. For all tile floors and tile base.

1. Manufacturer and color: as indicated on the drawings.

2.5 TILE AND GROUT SEALER (remodels only)

A. New Life Sealer – Apply per manufacturer’s written instructions where called out on drawings or as directed by Food Lion's Construction Manager. Emulsion type sealer that dries to glass clear film. Remove all loose surface debris with a clean treated dust mop, use a putty knife to remove gum spots. Strip all the old finish from the surface and thoroughly rinse surface prior to applying New Life Sealer. Apply two thin even coats with a microfiber applicator and allow to dry 30 minutes between coat as directed by manufacturer.

1. “New Life Sealer” by West Coast Chemical, PO Box 4572, Fresno, CA, 93744 – 1-800-223-0526

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: Angle or L-shape, stainless steel, ASTM A 666, 300 Series exposed-edge material.

C. Schluter QUADEC – square, satin anodized aluminum, finishing and edge protection for wall tile, outside corners.

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 installed tile.

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.

3.2 PREPARATION

A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with adhesives or thin-set 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 1/16 inch per foot toward drains.

C. Blending: For tile exhibiting color variations, use factory blended tile or blend tiles at Project site before installing.

D. Field-Applied Temporary Protective Coating: If indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, precoat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

E. Delivery and Storage: Manufactured materials shall be delivered in the manufacturer's original unbroken packages or containers that are labeled plainly with the manufacturer's names and brands. Containers for tile shall be grade sealed and delivered to the site with unbroken seals. Materials shall be stored in dry weather-tight enclosures, and shall be handled in a manner that will prevent the inclusion of foreign materials and damage by water or dampness. No broken or chipped quarry or ceramic tiles shall be used. All ceramic and quarry tiles shall have the same lot specification.

3.3 INSTALLATION

A. Comply with TCA's "Handbook for Ceramic Tile Installation" for TCA 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 TCA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.

1. For the following installations, follow procedures in the ANSI A108 Series of tile installation standards for providing 95 percent mortar coverage
2. Minimum 50 deg F temperature to be achieved prior to start of installation and for seven days after completion.

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. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. 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.

F. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:

1. Quarry Tile: 1/4 inch.
2. Paver Tile: 1/4 inch.
3. Glazed Wall Tile: 1/16 inch.
4. Porcelain Tile: 1/4 inch.

G. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.

H. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.

1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

I. Metal Edge Strips: Install where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with top of tile.

J. Install cementitious backer units and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated. Use latex-portland cement mortar for bonding material unless otherwise directed in manufacturer's written instructions.

K. Cleaning:

1. Clean tile surfaces as thoroughly as possible on completion of grouting.
2. Remove all grout haze, observing grout manufacturer's recommendations as to use of acid and chemical cleaners.
3. Rinse tile work thoroughly with clean water before and after using chemical cleaners.

L. Protection:

1. Cover all tile work with Heavy-Duty non-staining construction paper.
2. Prohibit all foot and wheel traffic from using newly tiled floors for at least three (3) days after completion of tile work.
3. Place large, flat boards under all ladders, scaffolds, etc., to be used on all installed tile work.

3.4 INTERIOR TILE INSTALLATION SCHEDULE

A. Interior Floor Installations, Concrete Subfloor:

1. Tile Installation F112: Cement mortar bed (thickset) bonded to concrete; TCA F112.

a. Tile Type: Porcelain.
b. Thin-Set Mortar for Cured-Bed Method: Dry-set portland cement mortar.
c. Grout: epoxy grout.

B. Interior Wall Installations, Masonry or Concrete:

1. Tile Installation W202: Thin-set mortar; TCA W202.

a. Tile Type: Porcelain.
b. Thin-Set Mortar: portland cement mortar.
c. Grout: Polymer-modified sanded grout.

2. Tile Installation W223: Organic adhesive; TCA W223.

a. Tile Type: Porcelain.
b. Grout: Polymer-modified sanded grout

END OF SECTION 09 30 00

SECTION 09 51 13 - ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes acoustical panels and exposed suspension systems for ceilings.

B. Related Sections:

1. 09 22 16 Non-Structural metal framing.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Warranty: Suspension System shall carry a 15 year warranty against rusting when installed with an acoustical ceiling with Humigard Plus performance.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Acoustical ceiling shall withstand the effects of earthquake motions determined according to ASCE/SEI 7 where store is located in a seismic zone.

B. 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: Comply with ASTM E 1264 for Class C materials.
2. Smoke-Developed Index: 450 or less.

2.2 ACOUSTICAL PANEL CEILINGS, GENERAL

A. Glass-Fiber-Based Panels: Made with binder containing no urea formaldehyde.

B. Acoustical Panel Standard: Comply with ASTM E 1264.

C. Metal Suspension System Standard: Comply with ASTM C 635.

D. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

2.3 ACOUSTICAL PANELS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Armstrong World Industries, Inc. – Louis John (407) 697-6768 cell (ljjohn@armstrongceilings.com)

B. Classification: Fine Fissured with Humigard Plus #1729. Locations indicated on the drawings.
1. Color: White.
2. NRC: ,55, Type E-400 mounting according to ASTM E 795.
3. Edge/Joint Detail: Square.
4. Thickness: 5/8 inch.
5. Modular Size: 24 by 48 inches.

C. Classification: Vinyl-Clad vinyl faced gypsum panel #670. Locations indicated on the drawings.

1. Color: White.
2. Edge/Joint Detail: Square.
3. Thickness: 1/2 inch.
4. Modular Size: 24 by 48 inches

D. Acoustical lay-in panels in the produce area (when shown on drawings): 2" Foam Double Sided FRP Panel as manufactured by Nudo Products, 2508 S. Grande Avenue, Springfield, ILL 62707. Phone: 1-800-826-4132. Product Number: F3PB500FRMRF200 or Southwest Vault Builders, 126 Oregon, Dallas, TX 75203. Phone: 1-800-749-1431 or (214) 948-1431.

2.4 METAL SUSPENSION SYSTEM

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Armstrong World Industries, Inc. Prelude XL system. Contact the Strategic Customer Service Center for national pricing and information. Phone 1-800-442-4212. Substitutions will not be allowed.

B. Narrow-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, not less than G30 coating designation; with prefinished 15/16-inch- wide metal caps on flanges.

1. Structural Classification: Intermediate-duty system.
2. End Condition of Cross Runners: Override (stepped) or butt-edge type.
3. Face Design: Flat, flush.

4. Cap Material: Steel cold-rolled sheet.
5. Cap Material: aluminum cold-rolled sheet at produce prep, meat prep, and Deli/Bakery
6. Cap Finish: Painted white.

C. 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.

D. Hanger wires: 12 ga.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install acoustical panel ceilings to comply with ASTM C 636/C 636M and seismic design requirements indicated, according to manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

B. 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, and comply with layout shown on reflected ceiling plans.

1. Arrange directionally patterned acoustical panels as indicated on reflected ceiling plans.

C. Additional Material:

1. The Contractor shall furnish two (2) extra unbroken boxes of each type ceiling board to match installed. Tile shall be delivered to Food Lion at time of store fixture installation and stored as directed by Food Lion representative. The contractor shall forward a certified letter to Food Lion which the above mentioned tile matches tiles used during construction and has been received at the store.

D. Coordination:

1. The work described in the Section shall be carefully coordinated with all related adjacent or connected work of the Contract. Contractor shall verify that grid system will accept the specified lighting fixtures without modification in all areas before grid is installed. Cost of modification to grid to accommodate lights will be borne by the Contractor.

E. Protection and Cleaning:
1. All acoustical units shall be protected from damage of any kind, including fingerprints.

Following completion of the job, soiled and/or discolored surfaces of the system shall be cleaned as recommended by the manufacturer. Damaged or improperly installed units shall be removed and replaced, at no additional cost to the Owner.

END OF SECTION 09 51 13

SECTION 09 65 19 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Vinyl composition floor tile
2. Solid Vinyl floor tile
3. Resilient Base
4. New and Remodel conditions

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. Products: Subject to compliance with requirements, provide the following:

1. Armstrong World Industries, Inc. - Anthony Lawson (770) 316-1705 cell (arlawson@armstrong.com)

B. Tile Standard: ASTM F 1066, Class 2, through-pattern tile.

C. Wearing Surface: Smooth.

D. Thickness: 0.125 inch.

E. Size: 12 by 12 inches.

2.3 LUXURY VINYL FLOOR TILE

A. Provide luxury vinyl tile with a 40 mil wear layer, size as specified on the construction drawings. Manufacturer, tile patterns and colors as specified on construction drawings.

2.4 VINYL BASE

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. NAFCO, Roppe, or Johnsonite

B. Product Standard: ASTM F 1861, Type TV (vinyl, thermoplastic).

1. Group: I (solid, homogeneous).
2. Style and Location:

a. Style B, Cove: Provide in areas with resilient flooring.

C. Minimum Thickness: 0.080 inch (2.0 mm).

D. Height: 4 inches (102 mm). (or as indicated on drawings)

E. Lengths: Manufacturer's standard lengths.

F. Outside Corners: Preformed.

G. Inside Corners: Preformed.

H. Colors and Patterns: Black Matte.

2.5 INSTALLATION MATERIALS

A. Trowelable Skimcoating Patching Compounds: MAPEI, Planipatch with Planipatch Plus or MAPEI Planiprep SC

B. Moisture reduction barrier: MAPEI Planiseal Easy

C. Self-Leveling Underlayment, Novoplan Easy

1. Primer required, please refer to manufacturers Technical Data sheet for appropriate primer.
2. For repair of existing substrate if tolerance exceeds 1/2".

D. Adhesives:

1. Adhesives for all dry areas shall be "MAPEI Ultrabond ECO 711 Any adhesives other than listed shall be prior approved by Food Lion Engineering/Construction Department.
2. Adhesives: Adhesives for all Wet areas shall be "MAPEI Ultrabond G21 [G15]. Any adhesives other than listed shall be prior approved by Food Lion Engineering/Construction Department. (Wet areas as indicated on plans).

E. Floor Wax: Provide protective coating, High Solids Wax acceptable by flooring 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. Identify and grind areas of concern: loose patch, high spots, expansion joints, contaminants, etc. If grinding is required to remove floor patch, high spots and abnormalities, this shall be done at no additional cost. Grinders shall be “INDUSTRIAL” grade machine with vacuum and HEPA filter system (comparable to HTC-500) with appropriate tooling to address all conditions. General contractor shall provide electrical hook-up for grinding equipment.

    a. Should grinding not be required (remove all white patch) sand entire floor with 16” (min.) floor buffing machine using 12 grit pads.
    b. After grinding and sanding, clean floor and install coat of patch primer and moisture inhibiter. Patch primer and moisture inhibiter shall be applied to both existing concrete substrates and new concrete substrates.
    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. Patch floor in 1/8” lifts, up to ½”. Any floor repairs requiring over ½” shall be made using leveling material rather than patch material. Cementuous based products only, no gypsum based products allowed.
    d. Acceptable slope not requiring corrective actions shall be ¼” maximum over 10’-0”
    e. Patch and sand slab using 100 grit pads to ensure smooth substrate for installation of VCT and to eliminate burns and cracked tiles.

2. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
3. 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.
4. 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 11 pH.
5. Moisture Testing: Moisture test to be performed before work begins. Use industry standard relative humidity probe test, one test point per 2,000 SQ/FT, minimum. Any readings above 82% require remediation attention. Written summary shall be provided to Food Lion Construction Manager for review and

records. If moisture test results are too high contact Food Lion Construction Manager to present remedial options and determine associated cost before proceeding. Planiseal Easy is rated up to 90% RH.

6. These conditions apply only to remodels:

    a. Cover gondolas, cases, and all other equipment exposed in the area of work with poly prior to grinding/sanding.
    b. Once acceptable moisture conditions have been achieved, remove existing VCT as identified on plans.

C. Do not install floor tiles until they are the same temperature as the space where they are to be installed.

D. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

E. Material Handling:

1. Deliver materials in good condition to the job site in the manufacturer's original unopened containers that bear the name and brand of the manufacturer, project identification, and shipping and handling instructions.
2. Store materials on site in flooring contractor's trailer in a clean, dry, space, off the ground, and protected from weather and from extremes of heat and cold until needed. Protect adhesives from freezing.
3. Maintain a minimum temperature in the spaces to receive the flooring and accessories of 65 degrees F (18 degrees C) and a maximum temperature of 100 degrees F (38 degrees C) for at least 72 hours before, during, and for not less than 72 hours after installation. Store resilient flooring materials, adhesives and accessories in the spaces where they will be installed for at least 72 hours before beginning installation. Thereafter, maintain a minimum temperature of 55 degrees F (13 degrees C) in areas where work is completed. Protect all materials from the direct flow of heat from hot-air registers, radiators, or other heating fixtures and appliances.
4. Install resilient flooring and accessories after the other finishing operations, including painting, have been completed. Close spaces to traffic during the installation of the flooring. Do not install resilient flooring over concrete slabs until they have been cured and are sufficiently dry to achieve a bond with the adhesive, in accordance with Food Lion specifications.

3.2 FLOOR TILE INSTALLATION

A. Comply with manufacturer's written instructions for installing floor tile.

B. Install floor tile according to floor finish plan drawing and approval of Food Lion Construction Manager.

C. 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 in pattern indicated.

D. 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 in pattern of colors and sizes indicated.

E. Install tile wall to wall before the installation of floor-set cabinets, casework, furniture, equipment, movable partitions, etc.

F. 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.

G. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.

H. 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.

I. 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.

J. Mapei Ultrabond ECO 711 shall be used in all areas with the exception of those noted below. 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. Mapei Ultrabond G21 adhesive shall be used in front of all cases at the Produce area. Extend the G21 adhesive for 4'-0" in front of these cases. Additionally, the flooring contractor shall apply clear silicone sealant along the terminating edge of all floor tile at all sales floor cases in the entire store to prevent migrating moisture.

K. Roll entire VCT area with a 100 lb. roller following installation.

3.3 CLEANING AND PROTECTION

A. Armstrong commercial vinyl composition tiles are coated with the Fast Start factory finish. It DOES NOT require removal after installation. It is compatible with commercial floor polish and eliminates the need to strip the tile. This saves time, money, and possible damage to the tile and adhesives.

B. Comply with manufacturer's written instructions for cleaning and protecting floor tile.

C. Floor Wax: Thoroughly clean and remove soil (sweep and/or vacuum), adhesive, and blemishes from floor tile surfaces and damp mop with a mild neutral detergent solution

before applying high solids floor wax (minimum four days after installation to allow floor tile to adhere). Flooring contractor to confirm gloss level with Food Lion Construction Manager prior to application.

1. Apply two coats of high solids floor wax.

D. Cover floor tile until Substantial Completion.

3.4 ADDITIONAL MATERIAL

A. The General Contractor shall furnish an additional 5% of unbroken VCT/LVT (which applies, per construction drawings) in each color to be left at the store. Tile shall be delivered to Food Lion store at the time of store fixture installation and stored as directed by Food Lion Construction Manager. The contractor shall forward a certified letter to Food Lion, which the above mentioned tile matches tiles used during construction, and has been received at the store. The floor tile "lot number" shall be clearly marked on the outside of the boxes of tile.

B. Complete repairs caused by case leaks and construction/operational damage (up to 200 SQ/FT at no cost to Food Lion.

C. If further repairs are needed (other than warranty work), pricing shall be determined before work begins. Food Lion Construction Manager shall determine cause of damage.

3.5 WARRANTY

A. Flooring contractor shall warranty resilient tile flooring installation for 18 months after installation.

B. Resilient tile manufacturer warranties the material to be free from defect for one full year (12 months) after installation.

C. Request and submit a 10 years single source system warranty from installation materials manufacturer.

END OF SECTION 09 65 19

SECTION 09 67 23 - RESINOUS FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes decorative resinous flooring systems for new and remodel conditions.

1.2 CLOSEOUT SUBMITTALS

A. Maintenance data.

B. Warranty: 5 year warranty on materials and installation to include cracking, peeling, fading, etc. Repair or replace at no additional cost to the Owner.

1.3 QUALITY ASSURANCE

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

B. Source Limitations: Obtain primary resinous flooring materials, including primers, resins, hardening agents, grouting coats, and topcoats, from single source from single manufacturer. Provide secondary materials, including patching and fill material, joint sealant, and repair materials, of type and from source recommended by manufacturer of primary materials.

1.4 PROJECT CONDITIONS

A. Environmental Limitations: Comply with resinous flooring manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring application.

B. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during resinous flooring application.

C. Close spaces to traffic during resinous flooring application and for not less than 24 hours after application unless manufacturer recommends a longer period.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Protective Industrial Polymers, Protect 4300 PA – Steve McCamey (804) 937-5000 Cell (activatedflooring@gmail.com)

a. Color: FL 106 - 600 Cool White, 150 Smoke, 125 Black, 4300 Topcoat.

2. Dur-A-Flex, Accelera HQ – Kevin Stephens (860) 528-9838 office (919) 208-8662 cell (kevin@dur-a-flex.com)

a. Color: FL 106 - X-265-65-2Q28

2.2 DECORATIVE RESINOUS FLOORING[ ]

A. Resinous Flooring: Abrasion-, impact- and chemical-resistant, decorative-aggregate-filled, cementitious urethane mortar-based, monolithic floor surfacing designed to produce a seamless floor and integral cove base.

B. System Characteristics:

1. Color and Pattern: custom color.
2. Wearing Surface: Textured for slip resistance. (C.O.F. of 0.6)
3. Overall System Thickness: nominal 3/16 inch.
4. Federal Agency Approvals: USDA approved for food-processing environments.

C. Body Coats:

1. Resin: urethane mortar.
2. Application Method: Self-leveling slurry with broadcast aggregates.

a. Thickness of Coats: 3/16 inch.
b. Number of Coats: One.

3. Aggregates: Manufacturer's standard.

D. Topcoat: Sealing or finish coats.

1. Resin: polyaspartic.
2. Type: Clear.
3. Finish: Matte.
4. Number of Coats: Two.

2.3 ACCESSORIES

A. Primer: Type recommended by manufacturer for substrate and body coats indicated.

B. Reinforcing Membrane (if required): Flexible resin formulation that is recommended by manufacturer for substrate and primer and body coats indicated and that prevents substrate cracks from reflecting through resinous flooring.

    a. Provide fiberglass scrim embedded in reinforcing membrane.

C. Patching and Fill Material: Resinous product of or approved by resinous flooring manufacturer and recommended by manufacturer for application indicated.

PART 3 - EXECUTION

3.1 PREPARATION

A. Concrete Substrates: Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with resinous flooring.

    1. Roughen concrete substrates as follows:

        a. Comply with ASTM C 811 requirements unless manufacturer's written instructions are more stringent.

    2. Repair damaged and deteriorated concrete according to resinous flooring manufacturer's written instructions.
    3. Verify that concrete substrates are dry and moisture-vapor emissions are within acceptable levels according to manufacturer's written instructions.

        a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with application of resinous flooring only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. of slab area in 24 hours.
        b. Perform plastic sheet test, ASTM D 4263. Proceed with application only after testing indicates absence of moisture in substrates.
        c. Perform 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.

    4. Alkalinity and Adhesion Testing: Verify that concrete substrates have pH within acceptable range. Perform tests recommended by manufacturer. Proceed with application only after substrates pass testing.

B. Resinous Materials: Mix components and prepare materials according to resinous flooring manufacturer's written instructions.

C. Use patching and fill material to fill holes and depressions in substrates according to manufacturer's written instructions.

D. Treat control joints and other nonmoving substrate cracks to prevent cracks from reflecting through resinous flooring according to manufacturer's written instructions.

E. Remodel Conditions:

1. General Contractor shall provide all labor and materials to disconnect, reconnect, and adjust all equipment and fixtures to coordinate with resinous flooring application.
2. Flooring Contractor shall take appropriate actions to identify any loose tiles or hollow cavities.
3. Sound out existing tile to ensure proper bond.
4. Remove any poorly bonded tile and repair with manufacturers approved grout (patching / leveling) material.

3.2 APPLICATION

A. General: Apply components of resinous flooring system according to manufacturer's written instructions to produce a uniform, monolithic wearing surface of thickness indicated.

1. Coordinate application of components to provide optimum adhesion of resinous flooring system to substrate, and optimum intercoat adhesion (mechanically prep existing substrate).
2. Cure resinous flooring components according to manufacturer's written instructions. Prevent contamination during application and curing processes.
3. At substrate expansion and isolation joints, comply with resinous flooring manufacturer's written instructions.

B. Apply urethane primer over prepared substrate at manufacturer's recommended spreading rate.

C. Apply reinforcing membrane to substrate cracks (apply scatch coat of urethane mortar to eliminate existing grout lines).

D. Integral Cove Base: Apply cove base mix to wall surfaces before applying flooring. Apply according to manufacturer's written instructions and details including those for taping, mixing, priming, troweling, sanding, and topcoating of cove base. Round internal and external corners.

1. Integral Cove Base: 4 inches high.

E. Apply self-leveling slurry body coats in thickness indicated for flooring system.

1. Broadcast aggregates at rate recommended by manufacturer and, after resin is cured, remove excess aggregates to provide surface texture indicated.

F. Apply topcoats in number indicated for flooring system and at spreading rates recommended in writing by manufacturer.

G. Protect resinous flooring from damage and wear during the remainder of construction period.

END OF SECTION 09 67 23

SECTION 09 68 13 - TILE CARPETING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes modular, fusion-bonded carpet tile.

1.2 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Comply with CRI 104.

1.4 FIELD CONDITIONS

A. Comply with CRI 104 for temperature, humidity, and ventilation limitations.

1.5 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 does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
2. Failures include, but are not limited to, more than 10 percent edge raveling, snags, runs, dimensional stability, excess static discharge, loss of tuft bind strength, loss of face fiber, and delamination.
3. Warranty Period:
    a. Portico Systems - 10 years from date of Substantial Completion.
    b. Mohawk Group – Limited Commercial Lifetime Warranty.

PART 2 - PRODUCTS

2.1 CARPET TILE

A. Products: Subject to compliance with requirements, provide the following:

1. Portico Systems (in Vestibule) - (NATIONAL ACCOUNT).

2. Mohawk Group (in Conference Room)

B. Color: indicated on drawings.

C. Pattern: indicated on drawings.

D. Fiber Type: polypropylene.

E. Primary Backing/Backcoating: Manufacturer's standard composite materials.

F. Secondary Backing: Manufacturer's standard material.

G. Size: 19 by 19 inches.

H. Applied Soil-Resistance Treatment: Manufacturer's standard material.

I. Antimicrobial Treatment: Manufacturer's standard material.

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: Manufacturer’s standard installation adhesive.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance. Examine carpet tile for type, color, pattern, and potential defects.

B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710.

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

D. Preparation: Comply with CRI 104, Section 6.2, "Site Conditions; Floor Preparation," and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile installation.

E. Installation: Comply with CRI 104, Section 14, "Carpet Modules," and with carpet tile manufacturer's written installation instructions.

F. Installation Method: As recommended in writing by carpet tile manufacturer.

G. Maintain dye lot integrity. Do not mix dye lots in same area.

H. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosing's. Bind or seal cut edges as recommended by carpet tile manufacturer.

I. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

J. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.

K. Install pattern parallel to walls and borders.

L. Perform the following operations immediately after installing carpet tile:

1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet tile manufacturer.
2. Remove yarns that protrude from carpet tile surface.
3. Vacuum carpet tile using commercial machine with face-beater element.

M. Protect installed carpet tile to comply with CRI 104, Section 16, "Protecting Indoor Installations."

3.2 ADDITIONAL MATERIAL

A. The Installation Contractor shall furnish an additional 5% of unbroken Carpet Tile (which applies, per construction drawings) in each color to be left at the store. Tile shall be delivered to Food Lion at the time of store fixture installation and stored as directed by Food Lion Representative. The contractor shall forward a certified letter to Food Lion, which the above mentioned tile matches tiles used during construction, and has been received at the store. The floor tile "lot number" shall be clearly marked on the outside of the boxes of tile.

END OF SECTION 09 68 13

SECTION 09 77 00 –DECORATIVE WALL SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES:

A. Decorative pre-finished interior wall panels.

1. Marlite Plank
2. Impact Specialties Acrovyn

1.2 SUBMITTALS

A. Provide manufacturer's product data sheets for approval.

1.3 DELIVERY

A. All products are to be factory packaged in heavy cardboard cartons.

B. All products are to be stored flat in a cool, dry place, do not stack panels directly on the floor, do not subject panels to moisture.

1.4 WARRANTY

A. All products shall be warranted to be free of defects for a period of 30 days from the date of delivery.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Decorative pre-finished interior wall panels shall be as manufactured by Marlite, 202 Harger Street, Dover, OH 44622, (603)924-9128. Jamie McEdward (330)260-7627, jmcedward@marlite.com

B. Decorative pre-finished interior wall panels shall be as manufactured by Impact Specialties, 4005 Royal Drive, Suite 100 Kennsaw, GA 30144, (888)424-6287 ORDERS@impactspecialties.com

2.2 MATERIALS

A. Wall panels shall be (product # and name).

1. Marlite Plank

a. Marlite Plank Finish: Federal Specification LLL-B-805 Class I Finish A.B.P.A. PS 59-73 Meets ANSI and AHA Standards for pre-finishing paneling

2. Impact Specialties Acrovyn

a. Engineered PETG: Rigid sheet should be high-impact Acrovyn 4000 with standard Suede texture, nominal .040" (1.02mm) thickness. Chemical and stain resistance should be per ASTM D543 standards as established by the manufacturer. Colors to be indicated in the finish schedule from one of manufacturer's available colors and patterns.

b. Aluminum: Optional aluminum trims to be alloy 6063 T5 with color matched finish; minimum strength and durability properties as specified in ASTM B221.

2.3 ACCESSORIES

A. Marlite Plank
1. All molding and trim shall be pre-finished at the factory. (Specifier to select molding/trim product # and name and finish). Complete system to be Marlite Manufactured.

B. Impact Specialties Acrovyn

1. All molding and trim shall be pre-finished at the factory. (Specifier to select trim product # and name and finish). Complete system to be Impact Specialties Manufactured.

C. Adhesive:

1. Marlite

a. C-915 Marlite Plank Construction Adhesive as required.
b. C-915 Marlite Allure Construction Adhesive as required.

2. Acrovyn

a. Acrovyn Water-Based Mastic Adhesive as required.

D. Silicone Sealant

1. Marlite

a. MS250 Clear or MS251 Marlite Silicone Sealant as required.

2. Acrovyn

a. Proprietary color-matched caulk

PART 3 - EXECUTION

3.1 PREPARATION

A. Marlite Plank must be installed over a smooth, solid, flat subwall such as drywall or plywood.

B. Impact Specialties Acrovyn must be installed over a smooth, solid, flat subwall such as drywall or plywood.

3.2 CONDITIONING

A. Cartons should be opened and allowed to acclimate to the room conditions for at least 48 hours prior to installation.

3.3 INSTALLATION

A. Wall coverings is to be installed in strict accordance with manufacturer's written instructions.

3.4 FIRE RATED TEST RESULTS (ASTM E-84)

A. Marlite Finish Plank

1. Flame spread <200
2. Class C
3. Smoke development <450

B. Marlite Wood Veneer Plank

1. Flame spread <25

C. Class A Marlite Finish Firetest Plank

1. Smoke development <450

D. Impact Specialties Acrovyn 4000

1. Flame spread <25
2. Class A
3. Smoke development <450

END OF SECTION 09 77 00

SECTION 09 91 10 - PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes surface preparation and the application of paint systems on exterior substrates.

1. Concrete.
2. Concrete masonry units (CMU).
3. Exterior steel (exposed ferrous metals)
4. Galvanized metal.
5. Stainless-steel and copper flashing.
6. Wood
7. Plastic trim fabrications.
8. Exterior gypsum board.
9. Exterior insulation finish system (EIFS)

B. Section includes surface preparation and the application of paint systems on interior substrates.

1. Concrete.
2. Concrete masonry units (CMU).
3. Steel, galvanized metal & aluminum
4. Galvanized metal.
5. Aluminum (not anodized or otherwise coated).
6. Wood.
7. Gypsum board.
8. Spray-textured ceilings.
9. Fire suppression
10. Plumbing.
11. HVAC.
12. Electrical.
13. Communication.
14. Electronic Safety and Security Work.
15. Cotton or canvas insulation covering.
16. Marlite

C. Related Sections:

1. 07 27 26 Fluid Applied Air Barriers

1.2 DEFINITIONS

A. Gloss Level 1 "Matte" – Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523

B. Gloss Level 2: “Flat” - Max 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

C. Gloss Level 3: “Eg-Shel” - 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

D. Gloss Level 4: “Satin” - 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.

E. Gloss Level 5: “ Semigloss” - 35 to 70 units at 60 degrees, according to ASTM D 523.

F. Gloss Level 6: “Gloss” - 70 to 85 units at 60 degrees, according to ASTM D 523.

G. Gloss Level 7: “High gloss” - More than 85 units at 60 degrees, according to ASTM D 523.

1.3 SUBMITTALS

A. Submit product data listing for each type of paint system and each color and gloss of topcoat intended for use, to Food Lion Construction Representative for review and approval prior to painting commencement.

1.4 QUALITY ASSURANCE

A. Mockups: Apply mockups of any paint system not in this specification to demonstrate aesthetic effects and set quality standards for materials and execution.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles for the paint category indicated.

1. Sherwin Williams

2.2 PAINT, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated. All paint materials selected for coating systems for each surface shall be the products of a single manufacturer.

B. Colors: As indicated in the finish schedule / drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
2. Masonry (Clay and CMU): 12 percent.
3. Wood: 15 percent.
4. 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 DELIVERY, STORAGE AND HANDLING

A. Delivery:

1. Deliver all paint materials to the job site in their original unopened containers with all labels intact and legible at time of use.

B. Protection:

1. Store only the approved materials at the job site, and store only in a suitable and designated area restricted to the storage of paint materials and related equipment.
2. Use all means necessary to ensure the safe storage and use of paint materials and the prompt and safe disposal of trash.
3. Use all means necessary to protect paint materials before, during and after application and to protect the installed work and materials of all other trades.
4. Protect all paints, varnishes, sealants, etc. from freezing. Do not use any product that has been frozen. Do not apply any paint/finish when the temperature is expected to drop below the minimum recommended temperature listed by the manufacturer.

C. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

3.3 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates, surface preparation and paint systems indicated.

B. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

C. All sap wood and knots shall receive a thin coat of shellac before priming or painting.

D. Concrete masonry walls to be painted shall be allowed to cure for a minimum of 7 days @ 75F. Concrete masonry floors to be painted shall be allowed to cure for a minimum of 28 days. Masonry shall be fully cleaned, brushed free of loose particles, and pointed prior to being painted. The block filler shall be applied by roller to provide a continuous void-free face for the paint.

E. Sand all woodwork thoroughly, removing machine marks and any defects prior to painting or finishing. Putty all nail holes, joints, cracks and other depressions in wood surfaces, prior to finish coats of painting.

F. Remove all rust or other damage to shop coat on ferrous metal surfaces. Re-prime damaged metal surfaces and bare metal surfaces with red oxid / equal grey primer prior to painting.

G. Painting shall not begin until roofing, flashing, and caulking is complete, and the Architect has certified the building weather-tight.

3.4 APPLICATION

A. Apply paints according to manufacturer's written instructions.

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.

C. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:

1. Paint the following work where exposed in equipment rooms:

a. Equipment, including panelboards and switch gear.
b. Uninsulated metal piping.
c. Uninsulated plastic piping.
d. Pipe hangers and supports.
e. Metal conduit.
f. Plastic conduit.
g. Tanks that do not have factory-applied final finishes.

h. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.

2. Paint the following work where exposed in occupied spaces:

a. Equipment, including panelboards.
b. Uninsulated metal piping.
c. Uninsulated plastic piping.
d. Pipe hangers and supports.
e. Metal conduit.
f. Plastic conduit.
g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
h. Other items as directed by Architect.

3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.5 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. The Painting Contractor shall furnish and lay drop cloths in all areas where paint is being done. All means necessary shall be utilized to protect all existing finishes from damage. Inspect all finishes after painting has been completed, and drop cloths have been removed, for damage. Remove paint drips found and repair all damage to like new condition.

C. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE - (NEW CONDITION) (SYSTEMS ARE BASED ON SHERWIN WILLIAMS PRODUCTS.)

A. Concrete Substrates, Nontraffic Surfaces:

1. Latex System:

a. Prime Coat: LOXON Concrete & Masonry Primer, A24W8300.
b. Intermediate Coat: LOXON Acrylic Coating, A24W351
c. Topcoat: LOXON Acrylic Coating, A24W351

B. Concrete Substrates, Traffic Surfaces:

1. Sherwin Williams Pro-Park Waterborne Traffic Marking Paint, B97 Series or MPI #97

a. Paint all pavement markings as called for on plans.

b. All painted marking white only, unless noted otherwise on drawings, 2 coats minimum.
c. Paint shall be applied in strict accordance with manufacturer's printed instructions.
d. The Contractor shall take all steps necessary to prevent tracking of freshly painted markings.

C. CMU Substrates:

1. Concrete Masonry. Exterior coating system to be:

a. First Coat Sherwin Williams Loxon Block Surfacer, A24W200
b. Second Coat Sherwin Williams Conflex XL High Build Coating, A5-400 Series (smooth), color as specified on drawings.

D. Coating System for Exterior Steel (Exposed Ferrous Metals)

1. Pigmented Polyurethane over Epoxy System:

a. Prime Coat: Epoxy, high-build, low gloss: S-W Macropoxy 646 Fast Cure Epoxy, B58 Series, at 5 to 10 mils dry, per coat. (SHOP PRIMER SHALL NOT BE CONSIDERED THE PRIME COAT).
b. Intermediate Coat: Polyurethane, two-component, pigmented, matching topcoat.
c. Topcoat: Polyurethane, two-component, pigmented gloss: S-W Acrolon Ultra High Performance Polyurethane, B65W820 Series/B65V820, at 2.0 to 3.0 mils dry, per coat.

2. Pipe guard bollards to be painted traffic yellow.
3. All exposed copper piping to be painted silver.

E. Galvanized-Metal Substrates:

1. Latex System:

a. Prime Coat: DTM Wash Primer, B71Y1
b. Intermediate Coat: Polyurethane, two-component, pigmented, matching topcoat.
c. Polyurethane, two-component, pigmented, gloss: S-W Acrolon Ultra High Performance Polyurethane, B65W820 Series/B65V820, at 2.0 to 3.0 mils dry, per coat.

F. Stainless-Steel & Copper Substrates:

1. Latex System:

a. Prime Coat: DTM Wash Primer, B71Y1.
b. Intermediate Coat: Polyurethane, two-component, pigmented, matching topcoat.
c. Polyurethane, two component, pigmented gloss: S-W Acrolon Ultra High Performance Polyurethane, B65W820 Series/B65V820

G. Wood Substrates: Including wood trim, wood siding, wood fences, wood-based panel products.

1. Latex System:

a. Prime Coat: A-100 Exterior Latex Wood Primer, B42W8041 .
b. Intermediate Coat: A-100 Exterior Acrylic Gloss, A8 Series.
c. Topcoat: A-100 Exterior Acrylic Gloss, A8 Series

H. Exterior Gypsum Board Substrates:

1. Latex System:

a. Prime Coat: Multi-Purpose Primer, B51-450.
b. Intermediate Coat: A-100 Acrylic Satin, A82 Series.
c. Topcoat: A-100 Acrylic Satin, A82 Series.

3.7 EXTERIOR PAINTING SCHEDULE - (PREVIOUSLY PAINTED) (SYSTEMS ARE BASED ON SHERWIN WILLIAMS PRODUCTS.)

A. Concrete & EIFS Substrates, Nontraffic Surfaces: (For EIFS Substrates, compatible coatings as manufactured by STO, DRYVIT, or PAREX USA will also be considered acceptable).

1. Latex System:

a. Prime Coat (bare or new concrete only): LOXON Concrete & Masonry Primer, A24W8300
b. Topcoat: LOXON Acrylic Coating, A24W351

B. Concrete Substrates, Traffic Surfaces:

1. Sherwin Williams Pro-Park Waterborne Traffic Marking Paint, B97 Series or MPI #97

a. Paint all pavement markings as called for on plans.
b. All painted marking white only, unless noted otherwise on drawings, 2 coats minimum.
c. Paint shall be applied in strict accordance with manufacturer’s printed instructions.
d. The Contractor shall take all steps necessary to prevent tracking of freshly painted markings.

C. CMU & Brick Substrates:

1. Concrete Masonry and Brick (Previously Painted). Exterior coating system to be:

a. Spot prime (bare masonry): LOXON Concrete & Masonry Primer, A24W8300.

b. Topcoat: Sherwin Williams Conflex XL High Build Coating, A5-400 Series (smooth), color as specified on drawings.

2. Colored Brick (not painted). Exterior coating system to be:

a. Power wash brick
b. Base Coat: Sherwin Williams Conflex XL High Build Coating, A5-400 Series (smooth), color as specified on drawings.
c. Topcoat: Sherwin Williams Conflex XL High Build Coating, A5-400 Series (smooth), color as specified on drawings.

D. Coating System for Exterior Steel (Exposed Ferrous Metals)

1. Pigmented Polyurethane over Epoxy System:

a. Prime Coat (bare or rusted areas only): Epoxy, high-build, low gloss: S-W Macropoxy 646 Fast Cure Epoxy, B58 Series, at 5 to 10 mils dry, per coat.
b. Topcoat: S-W Acrolon Ultra High Performance Polyurethane, B65W820 Series/B65V820, at 2.0 to 3.0 mils dry, per coat.

2. Pipe guard bollards to be painted traffic yellow.
3. All exposed copper piping to be painted silver.

E. Standing Seam Metal Roof Substrates:

1. Water-Based Light Industrial Coating System:

a. Primer: spot prime bare and rusted areas, anti-corrosive for metal: Sherwin Williams pro industrial pro-cryl universal primer, B66-310 series, 5.0 to 10.0 mils wet, 2.0 to 4.0, mils dry.
b. Topcoat: light industrial coating, exterior, water based, eg-shell: Sherwin Williams pro industrial multi-surface acrylic, B66-560 series, at 1.5 to 2.0 mils dry, per coat apply to full opacity.

F. Galvanized-Metal Substrates:

1. Polyurethane System:

a. Prime Coat (bare or new surfaces only): DTM Wash Primer, B71Y1
b. Topcoat: Polyurethane, two-component, pigmented, gloss: S-W Acrolon Ultra High Performance Polyurethane, B65W820 Series/B65V820, at 2.0-3.0 mils dry, per coat

G. Stainless-Steel & Copper Substrates:

1. Polyurethane System:

a. Prime Coat(for bare or new surfaces only): DTM Wash Primer, B71Y1.

b. Topcoat: Polyurethane, two-component, pigmented, gloss: S-W Acrolon Ultra High Performance Polyurethane, B65W820 Series/B65V820, at 2.0 to 3.0 mils dry, per coat.

H. Wood Substrates: Including wood trim, wood siding, wood fences, wood-based panel products.

1. Latex System:

a. Prime Coat(bare or new wood only): A-100 Exterior Latex Wood Primer, B42W8041.
b. Topcoat: A-100 Exterior Acrylic Gloss, A8 Series

I. Exterior Gypsum Board Substrates:

1. Acrylic System:

a. Prime Coat(bare or new surfaces only): Multi-Purpose Primer, B51-450.
b. Topcoat: A-100 Acrylic Satin, A82 Series.

3.8 INTERIOR PAINTING SCHEDULE - (NEW CONDITION) (SYSTEMS ARE BASED ON SHERWIN WILLIAMS PRODUCTS.)

A. Concrete Substrates:

1. Highway Traffic Rated Paint:

a. Floor must be thoroughly cleaned and abraded (acid etch or mechanical abrasion) prior to application.
b. Reference section 3.6 (B)

B. CMU Substrates:

1. Polyamide Epoxy System: Food prep areas & exterior facing walls as indicated on drawings

a. Block Filler: Loxon Block Surfacer, A24W200
b. Intermediate Coat: S-W Macropoxy 646 Fast Cure Epoxy, B58 Series, at 5 to 10 mils dry, per coat.
c. Topcoat: S-W Macropoxy 646 Fast Cure Epoxy, B58 Series, at 5 to 10 mils dry, per coat.

2. Pre-catalyzed Epoxy for all other high use areas (non-exterior walls)
a. Block Filler: Loxon Block Surfacer, A24W200
b. Top Coat: Pro Industrial Pre-Catalyzed Epoxy Eg-Shel, K45W150 Series.

C. Steel, Galvanized Metal & Aluminum Substrates:

1. Acrylic Dry-Fall System for open ceiling deck:

a. All paintable surfaces in area considered as open ceiling except sheetrock walls shall be painted with one coat of Pro Industrial Acrylic Dryfall Flat, B42W181. Spot Prime bare or rusted areas with Pro Industrial Pro-Cryl Metal Primer, B66W310.

2. Pre-Catalyzed Epoxy Semi-Gloss for all other metal: Including Hollow Metal Doors and Frames

a. Full Prime Coat over factory primer: Pro Industrial Pro-Cryl Metal Primer, B66W310
b. Intermediate Coat: Pro Industrial Pre-Catalyzed Epoxy Semi-Gloss, K46W150 Series.
c. Topcoat: Pro Industrial Pre-Catalyzed Epoxy Semi-Gloss, K46W150 Series.

D. Wood Substrates: Including wood trim architectural woodwork, doors, wood-based panel products.

1. Latex System:

a. Prime Coat: Multi-Purpose Primer, B51-450.
b. Intermediate Coat: Pro Industrial Pre-Catalyzed Epoxy Semi-Gloss, K46W150 Series
c. Topcoat: Pro Industrial Pre-Catalyzed Epoxy Semi-Gloss, K46W150 Series.

E. Gypsum Board Substrates:

1. Latex System:

a. Prime Coat: ProMar 200 Primer, B28W2600.
b. Prime Coat (on sales area walls only): ProBlock Interior Oil-Based Primer
c. Intermediate Coat: ProMar 200 Zero VOC Eg-Shel, B20W2650 Series.
d. Topcoat: ProMar 200 Zero VOC Eg-Shel, B20W2650 Series.

2. High use areas (Offices & Lounge)

a. Prime Coat: ProMar 200 Latex Primer, B28W2600.
b. Intermediate Coat: Pro Industrial Pre-Catalyzed Waterbased Epoxy Eg-shel, K45 Series.
c. Topcoat: Pro Industrial Pre-Catalyzed Waterbased Epoxy Eg-shel, K45 Series.

F. Cotton or Canvas and ASJ Insulation-Covering Substrates: Including pipe and duct coverings.

1. Latex System:

a. Prime Coat: DTM Priimer/Finish, B66W1.
b. Topcoat Coat: DTM Priimer/Finish, B66W1.

c. Retain one of six "Topcoat" subparagraphs below.

3.9 INTERIOR PAINTING SCHEDULE - (PREVIOUSLY PAINTED) (SYSTEMS ARE BASED ON SHERWIN WILLIAMS PRODUCTS. EQUAL PRODUCTS FROM PPG & DURON WILL BE ACCEPTED.)

A. Concrete Substrates:

1. Highway Traffic Rated Paint:

a. Floor must be thoroughly cleaned and abraded (acid etch or mechanical abrasion) prior to application.
b. Reference section 3.7 (B)

B. CMU Substrates:

1. Polyamide Epoxy System: Food prep areas & exterior facing walls as indicated on drawings

a. Block Filler(bare or new CMU only): Loxon Block Surfacer, A24W200
b. Topcoat: S-W Macropoxy 646 Fast Cure Epoxy, B58 Series, at 5 to 10 mils dry, per coat.

2. Pre-catalyzed Epoxy for all other high use areas (non-exterior walls)

a. Block Filler(bare or new CMU only): Loxon Block Surfacer, A24W200
b. Top Coat: Pro Industrial Pre-Catalyzed Epoxy Eg-Shel, K45W150 Series.

C. Steel, Galvanized Metal & Aluminum Substrates:

1. Acrylic Dry-Fall System for open ceiling deck:

a. All paintable surfaces in area considered as open ceiling except sheetrock walls shall be painted with one coat of Pro Industrial Acrylic Dryfall Flat, B42W181 to full opacity. Spot Prime bare or rusted areas with Pro Industrial Pro-Cryl Metal Primer, B66W310.

2. Pre-Catalyzed Epoxy Semi-Gloss for all other metal: Including Hollow Metal Doors and Frames previously painted with Alkyd Enamel

a. Surface Prep: scuff sand and wipe clean
b. Full Prime Coat over: Pro Industrial Pro-Cryl Metal Primer, B66W310
c. Topcoat: Pro Industrial Pre-Catalyzed Epoxy Semi-Gloss, K46W150 Series.

3. All substrates previously painted with Latex over Alkyd Enamel: Including Hollow Metal Doors and Frames

a. Surface Prep: Total removal of latex paint, scuff sand & wipe clean
b. Full Prime Coat: Pro-Cryl Metal Primer, B66W310
c. Topcoat: Pro Industrial Pre-Catalyzed Epoxy Semi-Gloss, K46W150

D. Wood Substrates: Including wood trim architectural woodwork, doors, wood-based panel products.

1. Latex System:

a. Prime Coat(bare or new wood only): Multi-Purpose Primer, B51-450.
b. Topcoat: Pro Industrial Pre-Catalyzed Epoxy Semi-Gloss, K46W150 Series

E. Gypsum Board Substrates:

1. Latex System:

a. Prime Coat (bare patch or new surfaces only): ProMar 200 Primer, B28W2600.
b. Prime Coat (on sales area walls only): ProBlock Interior Oil-Based Primer
c. Topcoat: ProMar 200 Zero VOC Eg-Shel, B20W2650 Series.

2. High use areas (Offices & Lounge)

a. Prime Coat: ProMar 200 Latex Primer, B28W2600.
b. Intermediate Coat: Pro Industrial Pre-Catalyzed Waterbased Epoxy Eg-shel, K45 Series.
c. Topcoat: Pro Industrial Pre-Catalyzed Waterbased Epoxy Eg-shel, K45 Series.

F. Cotton or Canvas and ASJ Insulation-Covering Substrates: Including pipe and duct coverings.

1. Latex System:

a. Topcoat: DTM Priimer/Finish, B66W1.

G. Marlite Substrates

1. Acrylic System:

a. Surface Prep: Clean Marlite surface of any residue materials. Degloss surface using a 3M pad or ultra fine grit sand paper. Fill any holes, cracks or imperfections with a wood filler or latex based caulk.
b. Prime Coat (use natural bristle or nylon/polyster brush; 1/4"-1/2" nap synthetic or mohair roller): Shellac Primer, BA9W8050.
c. Surface Prep: Lightly sand previously primed surface using fine grit sand paper.
d. Topcoat (use nylon/polyester brush; or 3/8" woven roller) (2 coats): Zero VOC Acrylic, B66-650.

END OF SECTION 09 91 13

SECTION 10 21 13 - TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Steel toilet compartments configured as toilet enclosures and urinal screens.
2. Stainless-steel toilet compartments configured as toilet enclosures and urinal screens.

1.2 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities" and ICC/ANSI A117.1 for toilet compartments designated as accessible.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Steel Sheet: Commercial steel sheet for exposed applications; mill phosphatized and selected for smoothness.

1. Hot-Dip Galvanized: ASTM A 653/A 653M, either hot-dip galvanized or galvannealed.

2.2 STEEL UNITS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. American Sanitary Partition Corporation.
2. Global Steel Products Corp.
3. Metpar Corp.

B. Toilet-Enclosure Style: Overhead braced, Floor anchored.

C. Urinal-Screen Style: Overhead braced, Floor anchored.

D. Door, Panel, and Pilaster Construction: Seamless, metal facing sheets pressure laminated to core material; with continuous, interlocking molding strip or lapped-and-formed edge closures; corners secured by welding or clips and exposed welds ground smooth. Exposed surfaces shall be free of pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections.

1. Core Material: Manufacturer's standard sound-deadening honeycomb of resin-impregnated kraft paper in thickness required to provide finished thickness of 1 inch for doors and panels and 1-1/4 inches for pilasters.
2. Grab-Bar Reinforcement: Provide concealed internal reinforcement for grab bars mounted on units.
3. Tapping Reinforcement: Provide concealed reinforcement for tapping (threading) at locations where machine screws are used for attaching items to units.

E. Urinal-Screen Construction:

1. Flat-Panel Urinal Screen: Matching panel construction.
2. Integral-Flange, Wall-Hung Urinal Screen: Similar to panel construction, with integral full-height flanges for wall attachment, and maximum 1-1/4 inches thick.

F. Facing Sheets and Closures: Electrolytically coated steel sheet with nominal base-metal (uncoated) thicknesses standard with manufacturer.

G. Pilaster: Stainless-steel sheet, not less than 3 inches high, finished to match hardware, with overhead Bracing.

H. Brackets (Fittings):

1. Stirrup Type: Ear or U-brackets; stainless steel or chrome-plated brass.

I. Steel-Sheet Finish: Manufacturer's standard baked-on finish, with one color in each room.

1. Color: as indicated on drawings.

2.3 STAINLESS-STEEL UNITS (if indicated on the drawings only)

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. American Sanitary Partition Corporation.
2. Global Steel Products Corp.
3. Metpar Corp.

B. Toilet-Enclosure Style: Overhead braced Floor anchored.

C. Urinal-Screen Style: Overhead braced, floor anchored.

D. Door, Panel, and Pilaster Construction: Seamless, metal facing sheets pressure laminated to core material; with continuous, interlocking molding strip or lapped-and-formed edge closures; corners secured by welding or clips and exposed welds ground

smooth. Exposed surfaces shall be free of pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections.

1. Core Material: Manufacturer's standard sound-deadening honeycomb of resin-impregnated kraft paper in thickness required to provide finished thickness of 1 inch for doors and panels and 1-1/4 inches for pilasters.
2. Grab-Bar Reinforcement: Provide concealed internal reinforcement for grab bars mounted on units.
3. Tapping Reinforcement: Provide concealed reinforcement for tapping (threading) at locations where machine screws are used for attaching items to units.

E. Urinal-Screen Construction:

1. Flat-Panel Urinal Screen: Matching panel construction.
2. Integral-Flange, Wall-Hung Urinal Screen: Similar to panel construction, with integral full-height flanges for wall attachment, and maximum 1-1/4 inches thick.
3. Wedge-Shaped, Wall-Hung Urinal Screen: Similar to panels, V-shaped, fabricated for concealed wall attachment, and maximum 6 inches wide at wall and minimum 1 inch wide at protruding end.

F. Facing Sheets and Closures: Stainless-steel sheet of nominal thicknesses standard with manufacturer:

G. Pilaster Shoes and Sleeves (Caps): Stainless-steel sheet, not less than 3 inches high, finished to match hardware.

H. Brackets (Fittings):

1. Stirrup Type: Ear or U-brackets; stainless steel or chrome-plated brass.

I. Stainless-Steel Finish: No. 4 bright, directional polish on exposed faces. Protect exposed surfaces from damage by application of strippable, temporary protective covering before shipment.

2.4 ACCESSORIES

A. Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories.

1. Material: Stainless steel
2. Hinges: Manufacturer's standard paired, self-closing type that can be adjusted to hold doors open at any angle up to 90 degrees.
3. Latch and Keeper: Manufacturer's standard surface-mounted slide latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.
4. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories.
5. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors.

6. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors 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 or chrome-plated steel or brass, 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.

2.5 FABRICATION

A. 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.

B. 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.

C. Door Size: Unless otherwise indicated, provide 24-inch- wide, doors for standard toilet compartments and 36-inch- wide, 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.

B. Clearances: Maximum 1/2 inch between pilasters and panels; 1 inch between panels and walls.

C. Stirrup Brackets: Secure panels to walls and to pilasters with no fewer than three brackets attached at midpoint and near top and bottom of panel. Locate wall brackets so holes for wall anchors occur in masonry or tile joints. 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 10 21 13

SECTION 10 28 00 - TOILET AND CUSTODIAL ACCESSORIES – (NATIONAL ACCOUNT)

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Public-use washroom accessories.
2. Warm-air dryers. (National Account Item)
3. Underlavatory guards.
4. Custodial accessories.

1.2 ACTION SUBMITTALS

A. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

1. Identify locations using room designations indicated.
2. Identify products using designations indicated.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.4 QUALITY ASSURANCE

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.

1.5 WARRANTY

A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PUBLIC-USE WASHROOM ACCESSORIES

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. American Specialties, Inc.
2. Bobrick Washroom Equipment, Inc.
3. Bradley Corporation.

B. Toilet Tissue (Roll) Dispenser:

1. Basis-of-Design Product: Bobrick SCA-66T .
2. Material and Finish: Stainless steel, No. 4 finish (satin).

C. Liquid-Soap Dispenser:

1. Basis-of-Design Product: Bobrick .
2. Description: Designed for dispensing soap in liquid or lotion form.
3. Mounting: Vertically oriented, surface mounted.
4. Lockset: Tumbler type.
5. Refill Indicator: Window type.

D. Grab Bar:

1. Basis-of-Design Product: Bobrick B-6106 series.
2. Mounting: Flanges with exposed fasteners.
3. Material: Stainless steel, 0.05 inch thick.

    a. Finish: Smooth, No. 4 finish (satin).

4. Outside Diameter: 1-1/4 inches.
5. Configuration and Length: As indicated on Drawings.

E. Sanitary-Napkin Disposal Unit:

1. Basis-of-Design Product: Bobrick B-254.
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:

1. Basis-of-Design Product: Bobrick B-165 and B-293 Series.
2. Frame: Stainless-steel channel, and Stainless steel, fixed tilt.

    a. Corners: Channel frame with welded corners.

3. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.

    a. Wall bracket of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.

4. Size: 18” x 30”.

5. 15 year silver spoilage warrenty.

2.2 WARM-AIR DRYERS

A. Manufacturers: provide products by the following:

1. Excel Dryer Corporation. Contact Curtis Scott (704) 376-4775 of George Scott & Associates (national account).

B. Warm-Air Dryer: “ThinAir” model, finish to be Stainless Steel wall guard.

2.3 CHILDCARE ACCESSORIES

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Safe-Strap Company, Inc., Diaper Depot – basic model #1300 (color as per plan). Contact Natalie Interdonato or customer service at (800) 356-7796.

B. Diaper-Changing Station:

1. Description: Horizontal unit that opens by folding down from stored position and with child-protection strap.

    a. Engineered to support a minimum of 250-lb static load when opened.

2. Mounting: Surface mounted, with unit projecting not more than 4 inches from wall when closed.
3. Operation: By pneumatic shock-absorbing mechanism.
4. Material and Finish: HDPE in manufacturer's standard color.
5. Liner Dispenser: Built in.

2.4 PROTECTIVE SHIELDING GUARDS

A. Protective Shielding Pipe Covers,:

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. Engineered Brass Company.
b. Insul-Tect Products Co.; a subsidiary of MVG Molded Products.
c. McGuire Manufacturing.
d. Plumberex.
e. Truebro; a brand of IPS Corporation.
f. Zurn Industries, LLC; Tubular Brass Plumbing Products Operation.

2. Description: Manufactured plastic wraps for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.

B. Protective Shielding Piping Enclosures:

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. Truebro; a brand of IPS Corporation.
b. Zurn Industries, LLC; Tubular Brass Plumbing Products Operation.

2. Description: Manufactured plastic enclosure for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with ADA requirements.

2.5 CUSTODIAL ACCESSORIES

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. American Specialties, Inc.
2. Bobrick Washroom Equipment, Inc.
3. Bradley Corporation.

B. Mop and Broom Holder:

1. Description: Unit with shelf, hooks, holders, and rod suspended beneath shelf.
2. Length: 36 inches.
3. Hooks: Three.
4. Mop/Broom Holders: Four, spring-loaded, rubber hat, cam type.
5. Material and Finish: Stainless steel, No. 4 finish (satin).

a. Shelf: Not less than nominal 0.05-inch- thick stainless steel.
b. Rod: Approximately 1/4-inch- diameter stainless steel.

2.6 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 10 28 00

SECTION 10 44 16 - FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes portable, hand-carried fire extinguishers and mounting brackets for 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 COORDINATION

A. Coordinate type and capacity of fire extinguishers with fire-protection cabinets to ensure fit and function.

1.5 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."

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 mounting bracket indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Badger Fire Protection.
b. Ansul Fire Protection
c. Amerex

2. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B.

B. Multipurpose Dry-Chemical Type Insert drawing designation: UL-rated 6 LBS. nominal capacity, with monoammonium phosphate-based dry chemical in manufacturer's standard enameled container.

2.3 MOUNTING BRACKETS

A. Mounting Brackets: Manufacturer's standard steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or red baked-enamel finish.

B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.

1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.

a. Orientation: Vertical.

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 and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.

1. Mounting Brackets: 54 inches above finished floor to top of fire extinguisher.

C. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

END OF SECTION 10 44 16

SECTION 10 73 00 - ALUMINUM CANOPIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Aluminum service canopies at dock and exterior egress doors.

1.2 DESIGN REQUIREMENTS

A. Struts, Gutter Beams, Deck, and Trim: Aluminum extrusions.

B. Structural Framing: Interlocking deck sections secured by screws.

C. Canopy: Self-draining from deck into perimeter gutter frame through scuppers to discharge point at ground level or as otherwise shown on drawings.

D. Design Loads:

1. Comply with Building Code for site location.

E. Structural Design: Prepare complete structural design calculations for canopy and canopy members.

PART 2 - PRODUCTS

2.1 DOCK & DSD SERVICE CANOPIES, OTHER SERVICE EGRESS DOOR CANOPIES WHERE REQUIRED:

A. Prefabricated and pre-finished aluminum canopy shall be capable of sustaining severe icing, snow drifting, hail, hurricane winds and being walked upon. Aluminum canopy shall be designed to meet loading imposed by ground snow load and drift provisions as required by the prevailing building code; and any heavier or additional loadings as required by AHJ. If required by AHJ, engineer sealed calculations shall be provided at no additional cost to Owner. Deck screws shall be stainless steel, sealed with neoprene “O” ring. Decking shall be a minimum of 24 gauge. Supports (2”x2” steel tube, U.N.O. on drawings) shall be spaced at 5’-0” on center (max.) and shall be connected to masonry with ½” thru-bolts with 3”x3”x3/16” plate washers on inside face of masonry; unless local design loadings dictate closer spacing of supports, larger bolts or washers. Slope supports at 45 degrees (min.) from horizontal. All decking, exposed fascia members, and supports shall have factory finish of primer and paint, color as noted on drawings.

B. Canopy shall have the following minimum load capabilities unless otherwise required by applicable building codes:

1. Wind: 90 mph
2. Load: 40 psf

2.2 MANUFACTURERS

A. Provide all overhead supported canopy components from a single manufacturer.

2.3 MATERIALS

A. Aluminum Extrusions: 6061-T6.

2.4 ACCESSORIES

A. Fasteners:

1. Deck Screws: No. 14 by 1 inch (25 mm), self-tapping, Type 18-8 stainless steel with neoprene washers.
2. Trim Screws: No. 10 by 1/2 inch (13 mm), self-tapping, Type 18-8 stainless steel.
3. Other Fasteners: Type 18-8 stainless steel, type recommended by manufacturer for specific condition.

2.5 FABRICATION (All canopies)

A. Shop Assembly: Fabricate with corners mitered and heli-arc welded to the extent that completed pieces can be shipped on local, state, and federal highways without special permit. Provide bolted connections for elements required to be shipped unassembled.

2.6 FINISHES (All canopies)

A. Struts, Deck, Fascia/Gutter:

1. Pre-finished, color as noted on drawings.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install aluminum canopies in strict accordance with the manufacturer’s recommendations and this specification. The information per this specification shall supersede manufacturer’s requirements. Maintain a copy of installation instructions of site for reference.

3.2 PROTECTION

A. Protect finished aluminum surfaces from damage due to subsequent construction operations.

END OF SECTION 10 73 00

SECTION 21 13 13 – WET-PIPE SPRINKLER SYSTEMS

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Provide and install a complete automatic wet sprinkler system in entire Food Lion building and storefront canopy, including all spaces in and above all walk-ins. Where system is located in areas unheated or subject to freezing (such as the storefront canopy) they shall be sprinkled with anti-freeze loop (where allowed by code). The location of anti-freeze loop and equipment shall be coordinated with Food Lion's Construction Manager. Dry system is to be used when anti-freeze loop is not allowed. Cold weather shut-off valves are not acceptable. Food Lion's sprinkler riser shall be totally separate and independent from all other shops and stores with the exception that it is determined by the sprinkler designer/engineer's calculations, that one sprinkler riser shall be sufficient to supply the Food Lion store as well as the shops. In the event that the Food Lion store and the shops share a common sprinkler riser, the split to shops shall occur prior to Food Lion store's flow indicator and all shops shall be monitored independently from Food Lion store. A shut off valve shall be placed at this point so the shops can be isolated from the Food Lion store for maintenance. Prior approval by Food Lion's, Engineering Dept. is required before drawings are permitted if the design is to include a common sprinkler riser.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract and Division 01 Specification Sections, apply to this Section.

1.3 SUMMARY

A. Section Includes:

1. Pipes, fittings, and specialties.
2. Fire-department connections.
3. Sprinklers.
4. Alarm devices.

1.4 DEFINITIONS

A. High-Pressure Sprinkler Piping: Wet-pipe sprinkler system piping designed to operate at working pressure higher than standard 175 psig, but not higher than 250 psig.

B. Standard-Pressure Sprinkler Piping: Wet-pipe sprinkler system piping designed to operate at working pressure of 175 psig maximum.

1.5 SYSTEM DESCRIPTIONS

A. Wet-Pipe Sprinkler System: Automatic sprinklers are attached to piping containing water and that is connected to water supply through riser check valve with trim. Water discharges immediately from sprinklers when they are opened. Sprinklers open when heat melts fusible link or destroys frangible device. Hose connections are included if indicated.

1.6 PERFORMANCE REQUIREMENTS

A. Standard-Pressure Piping System Component: Listed for 175-psig minimum working pressure unless otherwise indicated on drawings.

B. High-Pressure Piping System Component: Listed for 250-psig minimum working pressure unless otherwise indicated on drawings.

C. Delegated Design: Design sprinkler system(s), including comprehensive engineering NICET level 3 or above tech, using performance requirements and design criteria indicated.

1. Provide the fire-hydrant flow test records and indicate the following conditions:

a. Date: _____
b. Time: _____
c. Performed by: _____
d. Location of Residual Fire Hydrant R: _____
e. Location of Flow Fire Hydrant F: _____
f. Static Pressure at Residual Fire Hydrant R: _____
g. Measured Flow at Flow Fire Hydrant F: _____
h. Residual Pressure at Residual Fire Hydrant R: _____

D. Sprinkler system design and entire installation shall be made in full accordance with the latest rules and regulations of the local authorities having jurisdiction, the National Fire Protection Association and the above listed requirements.

1. Margin of Safety for Available Water Flow and Pressure: 10 percent, including losses through water-service piping, valves, and backflow preventers.
2. Sprinkler Occupancy Hazard Classifications:

a. Building Service Areas: Ordinary Hazard, Group 1.
b. Electrical Equipment Rooms: Ordinary Hazard, Group 1.
c. General Storage Areas: Ordinary Hazard, Group 2.
d. General Sales and Deli/Bakery Areas: Ordinary Hazard Group 2.
e. Machine Shops: Ordinary Hazard, Group 2.
f. Mechanical Equipment Rooms: Ordinary Hazard, Group 1.
g. Office and Public Areas: Light Hazard.
h. Restaurant Service Areas: Ordinary Hazard, Group 1.

3. Minimum Density for Automatic-Sprinkler Piping Design:

a. Light-Hazard Occupancy: 0.10 gpm over 1500-sq. ft. area.
b. Ordinary-Hazard, Group 1 Occupancy: 0.15 gpm over 1500-sq. ft. area.
c. Ordinary-Hazard, Group 2 Occupancy: 0.20 gpm over 1500-sq. ft. area.
d. Extra-Hazard, Group 1 Occupancy: 0.30 gpm over 2500-sq. ft. area.
e. Extra-Hazard, Group 2 Occupancy: 0.40 gpm over 2500-sq. ft. area.
f. Special Occupancy Hazard: As determined by authorities having jurisdiction.

4. Maximum Protection Area per Sprinkler: Per UL listing & NFPA.

5. Total Combined Hose-Stream Demand Requirement: According to NFPA 13 unless otherwise indicated:

    a. Light-Hazard Occupancies: 100 gpm for 30 minutes.
    b. Ordinary-Hazard Occupancies: 250 gpm for 60 to 90 minutes.
    c. Extra-Hazard Occupancies: 500 gpm for 90 to 120 minutes.

E. Seismic Performance: Architect / engineer of record is to determine if seismic design is to be required. Sprinkler piping shall withstand the effects of earthquake motions determined according to NFPA 13 and ASCE/SEI 7.

F. Commercial sprinkler contractor shall have a minimum of 5 years experience working as a licensed sprinkler contractor.

1.7 ACTION SUBMITTALS

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

B. Shop Drawings: For each type of sprinkler system. Include plans, elevations, sections, details, and attachments to other work.

1. Control Wiring Diagrams.
2. Hydraulic Calculation

1.8 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Sprinkler systems, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
1. Refrigeration piping.
2. HVAC ductwork.
3. Items penetrating finished ceiling include the following:

    a. Lighting fixtures.
    b. Air outlets and inlets.

B. Qualification Data: For qualified Installer, designer and/or professional engineer.

C. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction, including hydraulic calculations if applicable. Detailed drawings are required for this work, the sprinkler contractor shall prepare them and submit to the authority having jurisdiction. Outline all ductwork, lights and other obstructions on shop drawings to show proper installation of all sprinkler work.

1. Sprinklers shall be referred to on drawings and shall be specifically identified by the listed manufacturer’s style or series designation. Trade names and abbreviations are not permitted.

D. Drawings that have been stamped and approved by authority having jurisdiction shall be forwarded to the architect for approval. No work shall be installed until shop drawings as described above, have been approved by the architect.

1.9 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For sprinkler specialties to include in emergency, operation, and maintenance manuals.

1.10 QUALITY ASSURANCE

A. Installer Qualifications:

1. Installer's responsibilities include designing, fabricating, and installing sprinkler systems and providing NICET level 3 or above tech services needed to assume layout responsibility. Base calculations on results of fire-hydrant flow test.

a. Engineering Responsibility: Preparation of working plans, calculations, and field test reports by a qualified NICET level 3 or above tech.

B. Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

C. All grooved joint couplings, fittings, valves, and specialties shall be the products of a single manufacturer. Grooving tools shall be of the same manufacturer as the grooved components.

1. All castings used for coupling housings, fittings, valve bodies, etc., shall be date stamped for quality assurance and traceability.

D. 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, wired by others.

E. NFPA Standards: Sprinkler system equipment, specialties, accessories, installation, and testing shall comply with the following:

1. NFPA 13, "Installation of Sprinkler Systems."
2. NFPA 24, "Installation of Private Fire Service Mains and Their Appurtenances."
3. Local codes as required.

F. Materials and workmanship shall be guaranteed for a period of one (1) year from the date of completion of the installation.

1.11 PROJECT CONDITIONS

A. Interruption of Existing Sprinkler Service: Do not interrupt sprinkler service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide an equivalent level of service:

1. Notify Construction Manager no fewer than two days in advance of proposed interruption of sprinkler service.
2. Do not proceed with interruption of sprinkler service without Construction Manager's written permission.
3. Full sprinkler service to tenants shall be restored at the end of each day.

1.12 COORDINATION

A. The sprinkler system contractor shall make application for, obtain, and pay all fees in connections with permits, services, inspections, etc. including the following:

1. Temporary and permanent certificates of approval.
2. Hydraulic Calculations.
3. Water service and meters, only if included in scope of work.
4. Final certificates of approval, when job is completed.

B. Coordinate layout and installation of sprinklers with other construction that penetrates ceilings, including light fixtures, HVAC equipment, and partition assemblies.

C. All sprinkler lines shall be run concealed in all areas except where roof structure is visible, avoiding interference with lights, ducts, pipes, bins, storage areas, etc.

D. Sprinkler piping shall be installed at maximum height above floor in all locations throughout entire building both "Upper and Lower levels".

E. Before installing any piping, the sprinkler contractor shall verify that there is sufficient clearance between the bottom of the main supply duct and the top of the lay-in ceiling system to install his piping (minimum 7”). If it is determined that insufficient clearance is available, the contractor shall notify Food lion, L.L.C. immediately.

F. When fire hose, valves and cabinets are required by local codes, they shall be provided in addition to the sprinkler system. Exact location in the sales area shall be per code. Sprinkler heads shall be located in the center of the tile and no closer than 1' to the nearest light fixture.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, and fitting materials, and for joining methods for specific services, service locations, and pipe sizes.

2.2 STEEL PIPE AND FITTINGS

A. Standard Weight, Galvanized- and Black-Steel Pipe: ASTM A 53/A 53M, Type E, Grade B. Pipe ends may be factory or field formed to match joining method.

B. Cast-Iron Flanges: ASME 16.1, Class 125.

C. Steel Flanges and Flanged Fittings: ASME B16.5, Class 150.

D. Grooved End Fittings: ASTM A536, Grade 65-45-12, ductile iron short-pattern fittings with flow equal to standard pattern fittings.

2.3 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch thick or ASME B16.21, nonmetallic and asbestos free.

1. Class 125, Cast-Iron Flanges and Class 150, Bronze Flat-Face Flanges: Full-face gaskets.
2. Class 250, Cast-Iron Flanges and Class 300, Steel Raised-Face Flanges: Ring-type gaskets.

B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

C. Welding Filler Metals: Comply with AWS D10.12M/D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

D. Grooved joint couplings shall consist of two ductile iron housing segments, pressure responsive elastomer gasket, and ASTM A449 zinc-electroplated steel bolts and nuts.

1. Rigid: Coupling housings with offsetting, angle-pattern bolt pads shall be used to provide system rigidity and support and hanging in accordance with NFPA-13. Couplings shall be fully installed at visual pad-to-pad offset contact. Couplings that require gapping of bolt pads or specific torque ratings for proper installation are not permitted. Installation-Ready, for direct stab installation without field disassembly. Basis of Design: Victaulic Style 009H and 107N.

2. Flexible: Use in locations where vibration attenuation and stress relief are required. Basis of Design: Victaulic Style 177 Installation-Ready, and Style 77.

2.4 TRIM AND DRAIN VALVES

A. General Requirements:

1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
2. Pressure Rating: 175 psig minimum.

2.5 SPECIALTY VALVES

A. General Requirements:

1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
2. Pressure Rating:

   a. Standard-Pressure Piping Specialty Valves: 175 psig minimum.
   b. High-Pressure Piping Specialty Valves: 250 psig minimum.

3. Body Material: Cast or ductile iron.
4. Size: Same as connected piping.
5. End Connections: Flanged or grooved.

B. Riser Check Valves:

1. Standard: UL 193.
2. Design: For vertical installation.

3. Valve internal components shall be replaceable with valve in the installed position.
4. Include trim sets for bypass, drain, electrical sprinkler alarm switch, pressure gages, retarding chamber, and fill-line attachment with strainer.
5. Drip Cup Assembly: Pipe drain without valves and separate from main drain piping.
6. Drip Cup Assembly: Pipe drain with check valve to main drain piping.

C. Dry Valves:

1. Standard: UL 260.
2. Design: For vertical installation.
3. Pressure Rating: 300 psig maximum.
4. Valve internal components shall be replaceable with valve in the installed position.
5. Valve shall be externally resettable.
6. Required air pressure shall be 13-psig (90-kPa).

D. Automatic (Ball Drip) Drain Valves:

1. Standard: UL 1726.
2. Pressure Rating: 175 psig minimum.
3. Type: Automatic draining, ball check.
4. Size: NPS 3/4.
5. End Connections: Threaded.

E. Butterfly Valves:

1. Standard: UL 1091
2. Pressure Rating: 300 psig maximum.
3. Body Material: ASTM A536 ductile iron.
4. Disc: Electroless nickel coated ductile iron.
5. Stem: Stainless steel.
   a. Stem shall be offset from the disc centerline to provide complete 360-degree circumferential seating.
6. Actuator: Weatherproof actuator housing with handwheel and two SPDT supervisory switches.

F. Check Valves:

1. Standard: UL312
2. Pressure Rating: 250 psig maximum.
3. Body Material: ASTM A536 ductile iron.
4. Shaft and Spring: Stainless steel.
5. Installation: Vertical or horizontal.

2.6 FIRE-DEPARTMENT CONNECTIONS

A. Exposed-Type, Fire-Department Connection:

1. Standard: UL 405.
2. Type: Exposed, projecting, for wall mounting.

3. Pressure Rating: 175 psig minimum.
4. Body Material: Corrosion-resistant metal.
5. Inlets: Brass with threads according to NFPA 1963 and matching local fire-department sizes and threads. Include extension pipe nipples, brass lugged swivel connections, and check devices or clappers.
6. Caps: Brass, lugged type, with gasket and chain.
7. Escutcheon Plate: Round, brass, wall type.
8. Outlet: Back, with pipe threads.
9. Number of Inlets: Two.
10. Escutcheon Plate Marking: Similar to "AUTO SPKR & STANDPIPE."
11. Finish: Rough brass or bronze.
12. Outlet Size: NPS 4.

B. At the low point near each fire department connection, provide a 90-degree elbow with ball drip connection to allow for localized system drainage to prevent freezing.

2.7 SPRINKLERS

A. General Requirements:

1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
2. Sprinklers shall be glass bulb type, with hex shaped wrench boss integrally cast into the sprinkler body to reduce the risk of damage during installation. (Wrenches shall be provided by the sprinkler manufacturer that directly engage the cast wrench boss.)
3. Pressure Rating for Automatic Sprinklers: 175 psig minimum.
4. Pressure Rating for High-Pressure Automatic Sprinklers: 250 psig minimum
5. Extra Heads

    a. Provide cabinet containing twelve (12) spare pendant heads for each size and type of head used.
    b. Provide one (1) sprinkler wrench of each size and type of head.

B. Automatic Sprinklers with Heat-Responsive Element:

1. Early-Suppression, Fast-Response Applications: UL 1767.
2. Nonresidential Applications: UL 199.
3. Characteristics: Nominal 1/2-inch orifice with Discharge Coefficient K of 5.6, and for "Ordinary" temperature classification rating unless otherwise indicated or required by application.

C. Sprinkler Finishes:

1. Chrome plated (to match existing).
2. Bronze (upright exposed area).
3. White (finished ceiling area)
4. White polyester (exterior exposed area).

D. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for concealed and recessed-type sprinklers are specified with sprinklers.

1. Ceiling Mounting: two piece, flat, finished to match sprinkler.
2. Sidewall Mounting: two piece, flat, finished to match sprinkler.

E. Sprinkler Guards:

1. Standard: UL 199.
2. Type: Wire cage with fastening device for attaching to sprinkler.

F. Escutcheons and guards shall be listed.

2.8 ALARM DEVICES

A. Alarm-device types shall match piping and equipment connections.

B. Water-Flow Indicators:

1. Furnish and install one System Sensor or Potter water flow indicator with tamper-proof switch, to be installed in vertical risers, complete with electrical mechanisms to close the electrical circuit which operates the alarm gong and horn when a sprinkler head fuses. Include pneumatic retard to prevent false alarm.
2. Standard: UL 346.
3. Water-Flow Detector: Electrically supervised.
4. Components: Two single-pole, double-throw circuit switches for isolated alarm and auxiliary contacts, 7 A, 125-V ac and 0.25 A, 24-V dc; complete with factory-set, field-adjustable retard element to prevent false signals and tamperproof cover that sends signal if removed.
5. Type: Paddle operated.
6. Pressure Rating: 250 psig.
7. Design Installation: Horizontal or vertical.

PART 3 - EXECUTION

3.1 PREPARATION

A. Perform fire-hydrant flow test according to NFPA 13 and NFPA 291. Use results for system design calculations required in "Quality Assurance" Article.

B. Report test results promptly and in writing.

3.2 SERVICE-ENTRANCE PIPING

A. Connect sprinkler piping to water-service piping.

B. Install shutoff valve, pressure gage, drain, and other accessories indicated at connection to water-service piping.

C. Install shutoff valve, check valve, pressure gage, and drain at connection to water service.

3.3 WATER-SUPPLY CONNECTIONS

A. Connect sprinkler piping to building's interior water-distribution piping. Comply with requirements for interior piping in Section 22 11 16 "Domestic Water Piping."

B. Install shutoff valve, backflow preventer (per local codes), pressure gage, drain, and other accessories indicated at connection to water-distribution piping.

C. Install shutoff valve, check valve, pressure gage, and drain at connection to water supply.

3.4 PIPING INSTALLATION

A. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated, as far as practical.

1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Architect before deviating from approved working plans.

B. Piping Standard: Comply with requirements for installation of sprinkler piping in NFPA 13.

C. Install seismic restraints on piping (if required by engineer of record). Comply with requirements for seismic-restraint device materials and installation in NFPA 13.

D. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.

E. Install unions or grooved couplings adjacent to each valve in pipes NPS 2 and smaller.

F. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.

G. Install "Inspector's Test Connections" in sprinkler system piping, complete with shutoff valve, and sized and located according to NFPA 13.

H. Install sprinkler piping with drains for complete system drainage.

I. Install automatic (ball drip) drain valve at each check valve for fire-department connection, to drain piping between fire-department connection and check valve. Install drain piping to and spill over floor drain or to outside building.

J. Install alarm devices in piping systems.

K. Install hangers and supports for sprinkler system piping according to NFPA 13. Comply with requirements for hanger materials in NFPA 13.

L. Install pressure gages on riser or feed main, at each sprinkler test connection. Include pressure gages with connection not less than NPS 1/4 and with soft metal seated globe valve, arranged for draining pipe between gage and valve. Install gages to permit removal, and install where they will not be subject to freezing.

M. Pressurize and check dry sprinkler system piping and air-pressure maintenance devices.

N. Fill sprinkler system piping with water.

O. Install sleeves for piping penetrations of walls, ceilings, and floors as required by code.

P. Install sleeve seals for piping penetrations of concrete walls and slabs as required by code.

Q. Install escutcheons for piping penetrations of walls, ceilings, and floors.

3.5 JOINT CONSTRUCTION

A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.

B. Install unions or grooved couplings adjacent to each valve in pipes NPS 2 and smaller.

C. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.

D. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

E. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

F. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts according to ASME B31.9.

G. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

H. Steel-Piping, Pressure-Sealed Joints: Join lightwall steel pipe and steel pressure-seal fittings with tools recommended by fitting manufacturer.

I. Welded Joints: Construct joints according to AWS D10.12M/D10.12, using qualified processes and welding operators according to "Quality Assurance" Article.

1. Shop weld pipe joints where welded piping is indicated. Do not use welded joints for galvanized-steel pipe.

J. Steel-Piping, Cut-Grooved Joints: Cut square-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts in accordance with the manufacturer’s published instructions. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe joints.

K. Steel-Piping, Roll-Grooved Joints: Roll rounded-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts in accordance with the manufacturer's published instructions. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe grooved joints.

L. Steel-Piping, Pressure-Sealed Joints: Join Schedule 5 steel pipe and steel pressure-seal fittings with tools recommended by fitting manufacturer.

M. Brazed Joints: Join copper tube and fittings according to CDA's "Copper Tube Handbook," "Brazed Joints" Chapter.

N. Copper-Tubing Grooved Joints: Roll rounded-edge groove in end of tube according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join copper tube and grooved-end fittings according to AWWA C606 for steel-pipe grooved joints.

O. Copper-Tubing, Pressure-Sealed Joints: Join copper tube and copper pressure-seal fittings with tools recommended by fitting manufacturer.

P. Extruded-Tee Connections: Form tee in copper tube according to ASTM F 2014. Use tool designed for copper tube; drill pilot hole, form collar for outlet, dimple tube to form seating stop, and braze branch tube into collar.

Q. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

3.6 VALVE AND SPECIALTIES INSTALLATION

A. Install listed fire-protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to NFPA 13 and authorities having jurisdiction.

B. Install check valve in each water-supply connection. Install backflow preventers (per local codes), instead of check valves in potable-water-supply sources.

C. Specialty Valves:

1. General Requirements: Install in vertical position for proper direction of flow, in main supply to system.

3.7 SPRINKLER INSTALLATION

A. Install sprinklers in suspended ceilings in center of acoustical ceiling panels.

B. Install dry-type sprinklers with water supply from heated space. Do not install pendent or sidewall, wet-type sprinklers in areas subject to freezing.

C. Install sprinklers into flexible, sprinkler hose fittings and install hose into bracket on ceiling grid.

D. Sprinkler bulb protector shall be removed by hand after installation. Do not use tools or any other device(s) to remove the protector that could damage the bulb in any way.

E. Do not install sprinklers that have been dropped, damaged, or show a visible loss of fluid. Never install sprinklers with cracked bulbs.

3.8 FIRE-DEPARTMENT CONNECTION INSTALLATION

A. Install wall-type, fire-department connections.

B. Install yard-type, fire-department connections in concrete slab support. Comply with requirements for concrete in Section 03 30 00 "Cast-in-Place Concrete."

C. Install automatic (ball drip) drain valve at each check valve for fire-department connection.

3.9 IDENTIFICATION

A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13.

B. Permanently label and tag all valves indicating the part of the system controlled

C. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 26 05 53 "General Electrical Requirements"

3.10 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
3. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
4. Energize circuits to electrical equipment and devices.
5. Coordinate with fire-alarm tests. Operate as required.
6. Coordinate with fire-pump tests. Operate as required.
7. Verify that equipment hose threads are same as local fire-department equipment.

C. When completed, the entire piping system shall be tested, as required by the rules and regulations of the authority having jurisdiction, and must be free of leaks and other defects. Sprinkler piping system will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.11 CLEANING

A. Clean dirt and debris from sprinklers.

B. Remove and replace sprinklers with paint other than factory finish.

3.12 PIPING SCHEDULE

A. Piping between Fire-Department Connections and Check Valves: Galvanized, standard-weight steel pipe with threaded ends; cast-iron threaded fittings; and threaded joints.

B. Sprinkler specialty fittings may be used, downstream of control valves, instead of specified fittings.

C. Standard-pressure, wet-pipe sprinkler system, NPS 2 and smaller, shall be the following:

1. Standard-weight, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.
2. Standard-weight, black-steel pipe with grooved ends; coated, ductile-iron grooved end fittings; and grooved joint couplings of the same manufacturer.

D. Standard-pressure, wet-pipe sprinkler system, NPS 2-1/2 to NPS 4, shall be the following:

1. Standard-weight, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.
2. Standard-weight, black-steel pipe with grooved ends; coated, ductile-iron grooved end fittings; and grooved joint couplings of the same manufacturer.

E. Standard-pressure, wet-pipe sprinkler system, NPS 5 and larger, shall be the following:

1. Standard-weight, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.
2. Standard-weight, black-steel pipe with grooved ends; coated, ductile-iron grooved end fittings; and grooved joint couplings of the same manufacturer.

3.13 SPRINKLER SCHEDULE

A. Use sprinkler types in subparagraphs below for the following applications:

1. Sprinkler heads in walk-ins shall be white poltester coated semi-recessed, dry pendent heads and shall have a 10°cushion.
2. Sprinkler heads shall be located in the center of the tile and no closer than 1' to the nearest light fixture.
3. Those in ceiling tiles, plywood, gypsum board, and cooler panels and their escutcheons shall be semi-recessed white in finish. Heads in exposed areas to be natural finish with upright type head.
4. Install deflector plates on heads that are located adjacent to electrical equipment, to direct water flow away from equipment.
5. All sprinkler heads in lay-in ceiling areas shall be located in the center of ceiling tiles in both directions. See plans for possible special conditions (i.e., color) and different ceiling heights. When luminous panels, integrated ceiling system areas, and panels with speakers or downlights are shown on plans do not penetrate these areas, submit to Food lion, L.L.C. for approval the exact layout of all sprinkler heads should this conflict occur.

6. In lieu of a dry sprinkler system or anti-freeze loop in the front canopy, if acceptable to the authority having jurisdiction, a dry horizontal sprinkler designed for ordinary hazard use will be acceptable. Acceptable mountings shall be dry sleeve and skirt, flush mount, or extended mount. No exposed interior piping permitted. Acceptable finish will be brushed chrome or brushed mill finish.
7. For sprinkler heads installed in coolers or freezers, all penetrations shall be completely sealed at top/side of coolers and freezers with rubber boot, Tyco model DSB-2 boot or approved equal to prevent condensation from forming around sprinkler heads. Horizontal sidewall type sprinkler heads will be allowed in lieu of ceiling mounted and be driven thru cooler panel wall.
8. For sprinkler heads installed in lay-in ceiling tiles/suspended ceiling, sheet rock ceilings, or cooler panel ceilings, Vic-Flex braided stainless steel flexible drops (series AH2 [AB6 for dry systems / freezer applications]) are acceptable for connection to rigid branch line. Refer to manufacturer's installation manual (1-Vic-Flex) for all applicable ASTM ceiling material and installation standards. Union joints shall be provided for ease of installation. Mount with AB1 or AB2 one piece bracket with center open gate assembly by Victaulic / Vic-Flex to suspended ceiling grid, hat channel, or metal studs. The bracket shall allow installation before the ceiling tile is in place.

    a. The drop shall include a UL approved braided hose with a bend radius to 2" to allow for proper installation in confined spaces.
    b. The hose shall be listed for [(4) bends at 31" length] [(5) bends at 36" length] [(8) bends at 48" length] [(10) bends at 60" length] [(12) bends at 72" length].

B. Provide sprinkler types in subparagraphs below with finishes indicated.

1. Concealed Sprinklers: Rough brass, with factory-painted white cover plate.
2. Recessed Sprinklers: White, with white escutcheon.
3. Upright Pendent and Sidewall Sprinklers: Chrome plated in finished spaces exposed to view; rough bronze in unfinished spaces not exposed to view; wax coated where exposed to acids, chemicals, or other corrosive fumes.

END OF SECTION 21 13 13

SECTION 22 05 17 - SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Sleeves.
2. Sleeve-seal systems.

1.3 ACTION SUBMITTALS

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

PART 2 - PRODUCTS

2.1 SLEEVES

A. Sleeves shall be constructed of Schedule 40 galvanized steel pipe, except that for interior wall and chase penetrations, and floor penetrations within concealed pipe chases, may be constructed of galvanized sheet metal of not less than 16 U.S. Gage.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls. Sleeves shall be provided for all piping passing through concrete slabs except concrete slabs in contact with grade. Sleeves shall be provided for all piping passing through masonry, concrete, tile, and gypsum wall construction. Piping penetrating roof construction shall be provided with boots and/or sleeves as manufactured and approved by the roof supplier.

B. Where sleeves are placed in exterior walls below grade, the space between the pipe and the sleeves shall be packed with oakum and lead and made completely watertight.

C. Where pipe motion due to expansion and contraction will occur, make sleeves of sufficient diameter to permit free movement of pipe. Where sleeves pass insulated pipes the sleeves shall be large enough to pass the pipe and insulation. Check floor and wall construction finish to determine proper length of sleeves for various locations; make actual lengths to suit the following:

D. Fasten sleeves securely in floors, walls, so that they will not become displaced when concrete is poured or when other construction is built around them. Take precautions to prevent concrete, plaster, or other materials being forced into the space between pipe and sleeve during construction.

E. Install sleeves for pipes passing through interior partitions.

1. Cut sleeves to length for mounting flush with both surfaces.
2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint. Comply with requirements for sealants specified in Section 07 92 00 "Joint Sealants."

END OF SECTION 22 05 17

SECTION 22 05 18 - ESCUTCHEONS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Escutcheons.

1.3 ACTION SUBMITTALS

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

PART 2 - PRODUCTS

2.1 ESCUTCHEONS

A. Escutcheon Plate shall be nickel plated, of the split ring type, of size to match the pipe. Where plates are provided for pipes passing through sleeves which extend above the floor surface, provide deep recessed plates to conceal the pipe sleeves.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.

B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of insulated piping and with OD that completely covers opening.

3.2 FIELD QUALITY CONTROL

A. Replace broken and damaged escutcheons and floor plates using new materials.

END OF SECTION 22 05 18

SECTION 220529 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Fastener systems.

B. Related Sections:

1. Section 05 50 00 "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.

1.3 DEFINITIONS

A. MSS: Manufacturers Standardization Society of The Valve and Fittings Industry Inc.

1.4 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. This Contractor shall provide all miscellaneous angles, beams, columns, channels and bracing required for proper installation of his equipment from building structural steel where equipment support is not shown or detailed on architectural or structural drawings.

C. This Contractor shall, unless otherwise noted, furnish and install all necessary foundations, supports, pads, bases and piers required for all equipment, piping, pumps, tanks, compressors, etc., and for all other equipment furnished under this contract. For pumps, compressors, and other rotating machinery, and for all equipment where foundations are indicated or required, furnish and install concrete pads extending beyond machine base in all directions.

D. Structural Performance: Hangers and supports for plumbing piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

3. Design seismic-restraint hangers and supports for piping and equipment and obtain approval from authorities having jurisdiction.

1.5 ACTION SUBMITTALS

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

1.6 QUALITY ASSURANCE

A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

2.2 FASTENER SYSTEMS

A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.3 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

B. Fastener System Installation:

1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.

C. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

D. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

E. Install lateral bracing with pipe hangers and supports to prevent swaying.

F. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

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

H. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

I. Insulated Piping:

1. Attach clamps and spacers to piping.

a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
4. Shield Dimensions for Pipe: Not less than the following:

a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
b. NPS 4: 12 inches long and 0.06 inch thick.
c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.

5. Pipes NPS 8 and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.
6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.2 METAL FABRICATIONS

A. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

B. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and 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. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.3 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.4 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.

B. Touchup: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Section 09 91 23 "Interior Painting."

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.5 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use carbon-steel pipe hangers and supports and attachments for general service applications.

F. Use padded hangers for piping that is subject to scratching.

G. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30.

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

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.

I. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.

J. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.

K. Use powder-actuated fasteners instead of building attachments where required in concrete construction.

END OF SECTION 22 05 29

SECTION 22 05 53 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Pipe labels.

1.3 ACTION SUBMITTALS

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

B. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.

1.4 COORDINATION

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Metal Labels for Equipment:

1. Material and Thickness: Brass, 0.032-inch Stainless steel, 0.025-inch Aluminum, 0.032-inch or anodized aluminum, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.

2. Minimum Label Size: Nameplates on small equipment components shall be 2-1/2 inch by 3/4 inch. Nameplates on large equipment components shall be 4 inch by 1-1/2 inch.
3. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
4. Fasteners: Stainless-steel rivets or self-tapping screws.
5. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified.

C. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to partially cover circumference of pipe and to attach to pipe without fasteners or adhesive.

C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size: At least 1-1/2 inches.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 EQUIPMENT LABEL INSTALLATION

A. All component parts of each item of equipment or device shall bear the manufacturer's nameplate, giving name or manufacturer, description, size, type, serial and model number and electrical characteristics in order to facilitate maintenance or replacement. The nameplate of a Subcontractor or distributor will NOT be acceptable

B. All items of mechanical and related electrical equipment such as heaters, fans, pumps, etc., shall be identified by nameplates. Nameplates shall be securely affixed to each individual item of equipment and also to each starter, switch, relay, etc., which controls that equipment. Nameplates shall bear notations corresponding to the same notations on the framed control diagrams and operating instructions.

C. Locate equipment labels where accessible and visible.

3.3 PIPE LABEL INSTALLATION

A. Piping Color-Coding: Painting of piping is specified in Section 09 91 23 "Interior Painting."

B. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.
8. Nameplates shall be on an area of the equipment where it can be easily read by the maintenance people.

C. Pipe Label Color Schedule:

1. Domestic Water Piping:

    a. Background Color: White.
    b. Letter Color: Black.

END OF SECTION 22 05 53

SECTION 22 07 19 - PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes insulating the following plumbing piping services:

1. Domestic cold-water piping.
2. Domestic hot-water piping.
3. Domestic recirculating hot-water piping.
4. No insulation will be required at immediate domestic water connection at each fixture, or buried pipe, or condensate piping.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied, if any).

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
2. Detail attachment and covering of heat tracing inside insulation.
3. Detail insulation application at pipe expansion joints for each type of insulation.
4. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
5. Detail removable insulation at piping specialties, equipment connections, and access panels.
6. Detail application of field-applied jackets.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

B. Comply with the following applicable standards and other requirements specified for miscellaneous components:

1. Supply and Drain Protective Shielding Guards: ICC A117.1.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.6 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 22 05 29 "Hangers and Supports for Plumbing Piping and Equipment."

B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

C. Coordinate installation and testing of heat tracing.

1.7 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule," "Outdoor, Aboveground Piping Insulation Schedule," and "Outdoor, Underground Piping Insulation Schedule" articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

F. Flexible elastomeric closed cell insulation shall have a thermal conductivity of not greater than 0.27 BTU-inch/sq. ft - hr. - degree Fahrenheit in a mean temperature of 75 degrees Fahrenheit. Insulation shall be as manufactured by Armacell or Aeroflex USA. All closed cell (Armorflex type) insulation shall be white.

G. All insulation and associated materials shall have a composite fire and smoke hazard ratings as tested by procedure ASTM E-84, NFPA 255 and UL 723 not exceeding:

1. Flame Spread 25
2. Smoke developed 50 (200 for elastomeric)
3. Accessories such as adhesives, mastics, cements, tapes and cloth fittings shall have the same component ratings as listed above.

2.2 INSULATING CEMENTS

A. Expanded or Exfoliated Vermiculite Insulating Cement: Comply with ASTM C 196.

2.3 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.

B. Cellular-Glass Adhesive: Two-component, thermosetting urethane adhesive containing no flammable solvents, with a service temperature range of minus 100 to plus 200 deg F.

1. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. Flexible Elastomeric Adhesive: Comply with MIL-A-24179A, Type II, Class I.

1. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

D. PVC Jacket Adhesive: Compatible with PVC jacket.

1. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.4 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.

1. For indoor applications, use mastics that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below-ambient services.

1. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
2. Service Temperature Range: Minus 20 to plus 180 deg F.
3. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
4. Color: White.

C. Vapor-Barrier Mastic: Solvent based; suitable for indoor use on below-ambient services.

1. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 35-mil dry film thickness.
2. Service Temperature Range: 0 to 180 deg F.
3. Solids Content: ASTM D 1644, 44 percent by volume and 62 percent by weight.
4. Color: White.

D. Vapor-Barrier Mastic: Solvent based; suitable for outdoor use on below-ambient services.

1. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 30-mil dry film thickness.
2. Service Temperature Range: Minus 50 to plus 220 deg F.
3. Solids Content: ASTM D 1644, 33 percent by volume and 46 percent by weight.
4. Color: White.

E. Breather Mastic: Water based; suitable for indoor and outdoor use on above-ambient services.

1. Water-Vapor Permeance: ASTM F 1249, 1.8 perms at 0.0625-inch dry film thickness.
2. Service Temperature Range: Minus 20 to plus 180 deg F.
3. Solids Content: 60 percent by volume and 66 percent by weight.
4. Color: White.

2.5 LAGGING ADHESIVES

A. Description: Comply with MIL-A-3316C, Class I, Grade A, and shall be compatible with insulation materials, jackets, and substrates.

1. For indoor applications, use lagging adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over pipe insulation.
3. Service Temperature Range: 0 to plus 180 deg F.
4. Color: White.

2.6 SEALANTS

A. Joint Sealants:

1. Materials shall be compatible with insulation materials, jackets, and substrates.
2. Permanently flexible, elastomeric sealant.
3. Service Temperature Range: Minus 100 to plus 300 deg F.
4. Color: White or gray.
5. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Vinyl, PVDC, and PVC Jacket Flashing Sealants:

1. Materials shall be compatible with insulation materials, jackets, and substrates.

2. Fire- and water-resistant, flexible, elastomeric sealant.
3. Service Temperature Range: Minus 40 to plus 250 deg F.
4. Color: White.
5. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.7 FIELD-APPLIED FABRIC-REINFORCING MESH

A. Woven Glass-Fiber Fabric: Approximately 2 oz./sq. yd. with a thread count of 10 strands by 10 strands/sq. in. for covering pipe and pipe fittings.

B. Woven Polyester Fabric: Approximately 1 oz./sq. yd. with a thread count of 10 strands by 10 strands/sq. in., in a Leno weave, for pipe.

2.8 FIELD-APPLIED CLOTHS

A. Woven Glass-Fiber Fabric: Comply with MIL-C-20079H, Type I, plain weave, and presized a minimum of 8 oz./sq. yd..

2.9 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

2.10 SECUREMENTS

A. Bands:

1. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 304 or Type 316; 0.015 inch thick, 1/2 inch wide with wing seal or closed seal.
2. Aluminum: ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 1/2 inch wide with wing seal or closed seal.

B. Staples: Outward-clinching insulation staples, nominal 3/4-inch- wide, stainless steel or Monel.

C. Wire: 0.080-inch nickel-copper alloy.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.

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

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Surface Preparation: Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:

1. Stainless Steel: Coat 300 series stainless steel with an epoxy primer 5 mils thick and an epoxy finish 5 mils thick if operating in a temperature range between 140 and 300 deg F. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
2. Carbon Steel: Coat carbon steel operating at a service temperature between 32 and 300 deg F with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.

C. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

D. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

L. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.
2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.

    a. For below-ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

P. For above-ambient services, do not install insulation to the following:

1. Vibration-control devices.
2. Testing agency labels and stamps.
3. Nameplates and data plates.
4. Cleanouts.

3.4 PENETRATIONS

A. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
4. Seal jacket to wall flashing with flashing sealant.

B. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

C. Insulation Installation at Floor Penetrations:

1. Pipe: Install insulation continuously through floor penetrations.

3.5 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the

insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.

6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
8. For services not specified to receive a field-applied jacket except for flexible elastomeric, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
9. Stencil or label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

D. Install removable insulation covers at locations indicated. Installation shall conform to the following:

1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.
4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.6 INSTALLATION OF CELLULAR-GLASS INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of insulation to pipe with wire or bands and tighten bands without deforming insulation materials.

2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of cellular-glass block insulation of same thickness as pipe insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
2. When preformed sections of insulation are not available, install mitered sections of cellular-glass insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of cellular-glass insulation to valve body.
2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.

3.7 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:

1. Install pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed valve covers manufactured of same material as pipe insulation when available.
2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.8 FIELD-APPLIED JACKET INSTALLATION

A. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints. Seal with manufacturers recommended adhesive.

1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

3.9 FINISHES

A. Insulation with Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Section 099113 "Painting".

1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.

a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

D. Do not field paint aluminum or stainless-steel jackets.

3.10 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, two locations of threaded strainers, two locations of welded strainers, three locations of threaded valves, and three locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.

C. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.11 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:

1. Drainage piping located in crawl spaces.
2. Underground piping.
3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.12 INDOOR PIPING INSULATION SCHEDULE

A. Domestic Cold Water:

1. NPS 1 and Smaller: Insulation shall be one of the following:

a. Cellular Glass: 1-1/2 inches thick.
b. Flexible Elastomeric: 3/4 inch thick.

2. NPS 1-1/4 and Larger: Insulation shall be one of the following:

a. Cellular Glass: 1-1/2 inches thick.
b. Flexible Elastomeric: 3/4 inch thick.

B. Domestic Hot and Recirculated Hot Water:

1. NPS 1-1/4 and Smaller: Insulation shall be one of the following:

a. Cellular Glass: 1-1/2 inches thick.
b. Flexible Elastomeric: 3/4 inch thick.

3.13 INDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket as required by code.

END OF SECTION 22 07 19

SECTION 22 11 16 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Under-building-slab and aboveground domestic water pipes, tubes, and fittings inside buildings.

1.3 ACTION SUBMITTALS

A. Product Data: For transition fittings and dielectric fittings.

1.4 FIELD CONDITIONS

A. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:

1. Notify Construction Manager no fewer than two days in advance of proposed interruption of water service.
2. Do not interrupt water service without Construction Manager's written permission.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

B. Potable-water piping and components shall comply with NSF 14 and NSF 61. Plastic piping components shall be marked with "NSF-pw."

2.2 COPPER TUBE AND FITTINGS

A. Hard Copper Tube: ASTM B 88, Type L and ASTM B 88, Type M water tube, drawn temper.

B. Cast-Copper, Solder-Joint Fittings: ASME B16.18, pressure fittings.

C. Wrought-Copper, Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.

D. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.

E. Copper Unions:

1. MSS SP-123.
2. Cast-copper-alloy, hexagonal-stock body.
3. Ball-and-socket, metal-to-metal seating surfaces.
4. Solder-joint or threaded ends.

2.3 PVC PIPE AND FITTINGS

A. PVC Pipe: ASTM D 1785, Schedule 80.

B. PVC Socket Fittings: ASTM D 2466 for Schedule 40 and ASTM D 2467 for Schedule 80.

C. PVC Schedule 80 Threaded Fittings: ASTM D 2464.

2.4 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials:

1. AWWA C110/A21.10, rubber, flat face, 1/8 inch thick or ASME B16.21, nonmetallic and asbestos free unless otherwise indicated.
2. Full-face or ring type unless otherwise indicated.

B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

C. Solder Filler Metals: ASTM B 32, lead-free alloys.

D. Flux: ASTM B 813, water flushable.

E. Solvent Cements for Joining PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.

1. PVC solvent cement shall have a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Adhesive primer shall have a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

F. Plastic, Pipe-Flange Gaskets, Bolts, and Nuts: Type and material recommended by piping system manufacturer unless otherwise indicated.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Comply with requirements in Section 312000 "Earth Moving" for excavating, trenching, and backfilling.

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install copper tubing under building slab according to CDA's "Copper Tube Handbook."

C. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve inside the building at each domestic water-service entrance. Comply with requirements for pressure gages in Section 220519 "Meters and Gages for Plumbing Piping" and with requirements for drain valves and strainers in Section 221119 "Domestic Water Piping Specialties."

D. Install water-pressure-reducing valves downstream from shutoff valves.

E. Install domestic water piping level with 0.25 percent slope downward toward drain and plumb.

F. Rough-in domestic water piping for water-meter installation according to utility company's requirements.

G. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

H. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

I. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.

J. Install piping to permit valve servicing.

K. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than the system pressure rating used in applications below unless otherwise indicated.

L. Install piping free of sags and bends.

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

N. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.

O. Install pressure gages on suction and discharge piping for each plumbing pump and packaged booster pump.

P. Install thermostats in hot-water circulation piping.

Q. Install thermometers on outlet piping from each water heater.

R. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

S. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

T. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.3 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

D. Brazed Joints for Copper Tubing: Comply with CDA's "Copper Tube Handbook," "Brazed Joints" chapter.

E. Soldered Joints for Copper Tubing: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."

F. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts according to ASME B31.9.

G. Joint Construction for Solvent-Cemented Plastic Piping: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements. Apply primer.

2. PVC Piping: Join according to ASTM D 2855.

H. Joints for Dissimilar-Material Piping: Make joints using adapters compatible with materials of both piping systems.

3.4 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for seismic-restraint devices in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

B. Comply with requirements for pipe hanger, support products, and installation in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

1. Vertical Piping: MSS Type 8 or 42, clamps.
2. Individual, Straight, Horizontal Piping Runs:

a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.

3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
4. Base of Vertical Piping: MSS Type 52, spring hangers.

C. Support vertical piping and tubing at base and at each floor.

D. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch.

E. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 3/4 and Smaller: 60 inches with 3/8-inch rod.
2. NPS 1 and NPS 1-1/4: 72 inches with 3/8-inch rod.
3. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
4. NPS 2-1/2: 108 inches with 1/2-inch rod.
5. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.
6. NPS 6: 10 feet with 5/8-inch rod.
7. NPS 8: 10 feet with 3/4-inch rod.

F. Install supports for vertical copper tubing every 10 feet.

G. Install vinyl-coated hangers for PVC piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 2 and Smaller: 48 inches with 3/8-inch rod.
2. NPS 2-1/2 to NPS 3-1/2: 48 inches with 1/2-inch rod.
3. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.
4. NPS 6: 48 inches with 3/4-inch rod.
5. NPS 8: 48 inches with 7/8-inch rod.

H. Install supports for vertical PVC piping every 48 inches.

I. Support piping and tubing not listed in this article according to MSS SP-69 and manufacturer's written instructions.

3.5 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. When installing piping adjacent to equipment and machines, allow space for service and maintenance.

C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.

D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:

1. Domestic Water Booster Pumps: Cold-water suction and discharge piping.
2. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
3. Plumbing Fixtures: Cold- and hot-water-supply piping in sizes indicated, but not smaller than that required by plumbing code.
4. Equipment: Cold- and hot-water-supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 and larger.

3.6 IDENTIFICATION

A. Identify system components. Comply with requirements for identification materials and installation in Section 220553 "Identification for Plumbing Piping and Equipment."

B. Label pressure piping with system operating pressure.

3.7 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Piping Inspections:

a. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
b. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:

1) Roughing-in Inspection: Arrange for inspection of piping before concealing or closing in after roughing in and before setting fixtures.

2) Final Inspection: Arrange for authorities having jurisdiction to observe tests specified in "Piping Tests" Subparagraph below and to ensure compliance with requirements.

c. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
d. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

2. Piping Tests:

a. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
b. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
c. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
d. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow it to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
e. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.
f. Prepare reports for tests and for corrective action required.

B. Domestic water piping will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.8 ADJUSTING

A. Perform the following adjustments before operation:

1. Close drain valves, hydrants, and hose bibbs.
2. Open shutoff valves to fully open position.
3. Open throttling valves to proper setting.
4. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.

a. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide hot-water flow in each branch.
b. Adjust calibrated balancing valves to flows indicated.

5. Remove plugs used during testing of piping and for temporary sealing of piping during installation.
6. Remove and clean strainer screens. Close drain valves and replace drain plugs.

7. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.
8. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.9 CLEANING

A. Clean and disinfect potable domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:

    a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
    b. Fill and isolate system according to either of the following:

        1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
        2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.

    c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
    d. Repeat procedures if biological examination shows contamination.
    e. Submit water samples in sterile bottles to authorities having jurisdiction.

B. Clean non-potable domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging procedures prescribed by authorities having jurisdiction or; if methods are not prescribed, follow procedures described below:

    a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
    b. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.

C. Prepare and submit reports of purging and disinfecting activities. Include copies of water-sample approvals from authorities having jurisdiction.

D. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

3.10 PIPING SCHEDULE

A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

B. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.

C. Exterior, domestic water piping, NPS 4 and smaller, shall be the following:

1. PVC, Schedule 80; socket fittings; and solvent-cemented joints.
2. Pipe larger than 4 inches in diameter shall be PVC AWWA C900-75 SDR-13.5 or cast iron ANSI A21.6-1970.
3. Joints in PVC pipe shall be made with rubber rings conforming to ASTM C-1869. Joints in cast iron shall conform to ANSI 21.11.

D. Interior, domestic water piping, NPS 2 and smaller, shall be the following:

1. Copper Tubing: Type L or M with cast or wrought solder joint fittings. Joints shall be made using a low corrosion flux equal to "Nokorode" and "Taracorp" or equal solder consisting of 95% tin and 5% antimony, with minimum shear strength of 6000 lb/sq in.

END OF SECTION 22 11 16

SECTION 22 13 16 - SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Pipe, tube, and fittings.

1.3 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:

1. Soil, Waste, and Vent Piping: 10-foot head of water.

B. Seismic Performance: Soil, waste, and vent piping and support and installation shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1.4 ACTION SUBMITTALS

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

B. Shop Drawings: For sovent drainage system. Include plans, elevations, sections, and details.

1.5 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF/ANSI 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping and "NSF-sewer" for plastic sewer piping.

1.6 PROJECT CONDITIONS

A. Interruption of Existing Sanitary Waste Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify Construction Manager no fewer than two days in advance of proposed interruption of sanitary waste service.
2. Do not proceed with interruption of sanitary waste service without Construction Manager's written permission.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.2 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: CISPI 301.

B. Sovent Stack Fittings: ASME B16.45 or ASSE 1043, hubless, cast-iron aerator and deaerator drainage fittings.

C. CISPI, Hubless-Piping Couplings:

1. Standards: ASTM C 1277 and CISPI 310.
2. Description: Stainless-steel corrugated shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

2.3 PVC PIPE AND FITTINGS

A. Solid-Wall PVC Pipe: ASTM D 2665, drain, waste, and vent. Cellular core PVC shall not be used. Couplings shall be same material as plastic piping or “No-Hub” couplings with Stainless Steel shear ring. (Fernco or Fernco style coupling shall not be used). Any line repair completed with a rubber repair coupling shall include a stainless steel shear ring. No line offsets after backfill and tamp will be accepted.

B. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns and to fit Schedule 40 pipe.

C. Adhesive Primer: ASTM F 656.

1. Adhesive primer shall have a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

D. Solvent Cement: ASTM D 2564.

1. PVC solvent cement shall have a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 EARTH MOVING

A. Comply with requirements for excavating, trenching, and backfilling specified in Section 31 20 00 "Earth Moving."

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping to permit valve servicing.

F. Install piping at indicated slopes.

G. Install piping free of sags and bends.

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

I. Install piping to allow application of insulation.

J. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

K. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

L. Install soil and waste drainage and vent piping at the following minimum slopes unless otherwise indicated:

1. Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 3 and smaller; 1 percent downward in direction of flow for piping NPS 4 and larger.
2. Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow.
3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.

M. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

N. Install aboveground PVC piping according to ASTM D 2665.

O. Install underground PVC piping according to ASTM D 2321.

P. Install engineered soil and waste drainage and vent piping systems as follows:

1. Combination Waste and Vent: Comply with standards of authorities having jurisdiction.
2. Sovent Drainage System: Comply with ASSE 1043 and sovent fitting manufacturer's written installation instructions.
3. Reduced-Size Venting: Comply with standards of authorities having jurisdiction.

Q. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

R. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 22 05 17 "Sleeves and Sleeve Seals for Plumbing Piping."

S. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 22 05 17 "Sleeves and Sleeve Seals for Plumbing Piping."

T. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 22 05 18 "Escutcheons for Plumbing Piping."

3.3 JOINT CONSTRUCTION

A. Join hub-and-spigot, cast-iron soil piping with calked joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead-and-oakum calked joints.

B. Join hubless, cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

D. Grooved Joints: Cut groove ends of pipe according to AWWA C606. Lubricate and install gasket over ends of pipes or pipe and fitting. Install coupling housing sections, over gasket, with keys seated in piping grooves. Install and tighten housing bolts.

E. Flanged Joints: Align bolt holes. Select appropriate gasket material, size, type, and thickness. Install gasket concentrically positioned. Use suitable lubricants on bolt threads. Torque bolts in cross pattern.

F. Plastic, Nonpressure-Piping, Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
2. PVC Piping: Join according to ASTM D 2855 and ASTM D 2665 Appendixes.

3.4 SPECIALTY PIPE FITTING INSTALLATION

A. Dielectric Fittings:

1. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

3.5 VALVE INSTALLATION

A. General valve installation shall be installed to satisfy code and manufacturers recommendations.

B. Shutoff Valves:

1. Install shutoff valve on each sewage pump discharge.
2. Install gate or full-port ball valve for piping NPS 2 and smaller.
3. Install gate valve for piping NPS 2-1/2 and larger.

C. Check Valves: Install swing check valve, between pump and shutoff valve, on each sewage pump discharge.

D. Backwater Valves: Install backwater valves in piping subject to backflow.

1. Horizontal Piping: Horizontal backwater valves. Use normally closed type unless otherwise indicated.
2. Floor Drains: Drain outlet backwater valves unless drain has integral backwater valve.
3. Install backwater valves in accessible locations.
4. Comply with requirements for backwater valve specified by engineer of record and code.

3.6 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for seismic-restraint devices specified in Section 22 05 48 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

B. Comply with requirements for pipe hanger and support devices and installation specified in Section 22 05 29 "Hangers and Supports for Plumbing Piping and Equipment."

1. Install carbon-steel pipe hangers for horizontal piping in noncorrosive environments.
2. Install stainless-steel pipe hangers for horizontal piping in corrosive environments.
3. Install carbon-steel pipe support clamps for vertical piping in noncorrosive environments.
4. Install stainless-steel pipe support clamps for vertical piping in corrosive environments.
5. Vertical Piping: MSS Type 8 or Type 42, clamps.
6. Install individual, straight, horizontal piping runs:

    a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
    b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
    c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.

7. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
8. Base of Vertical Piping: MSS Type 52, spring hangers.

C. Support horizontal piping and tubing within 12 inches of each fitting, valve, and coupling.

D. Support vertical piping and tubing at base and at each floor.

E. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch minimum rods.

F. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
2. NPS 3: 60 inches with 1/2-inch rod.
3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
4. NPS 6 and NPS 8: 60 inches with 3/4-inch rod.
5. NPS 10 and NPS 12: 60 inches with 7/8-inch rod.
6. Spacing for 10-foot lengths may be increased to 10 feet. Spacing for fittings is limited to 60 inches.

G. Install supports for vertical cast-iron soil piping every 15 feet.

H. Install hangers for PVC piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2: 48 inches with 3/8-inch rod.
2. NPS 3: 48 inches with 1/2-inch rod.
3. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.
4. NPS 6 and NPS 8: 48 inches with 3/4-inch rod.
5. NPS 10 and NPS 12: 48 inches with 7/8-inch rod.

I. Install supports for vertical PVC piping every 48 inches.

J. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.7 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.

C. Connect drainage and vent piping to the following:

1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.
2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.
4. Install test tees (wall cleanouts) in conductors near floor and floor cleanouts with cover flush with floor.
5. Install horizontal backwater valves with cleanout cover flush with floor.
6. Equipment: Connect drainage piping as indicated. Provide shutoff valve if indicated and union for each connection. Use flanges instead of unions for connections NPS 2-1/2 and larger.

D. Connect force-main piping to the following:

1. Sanitary Sewer: To exterior force main.
2. Sewage Pump: To sewage pump discharge.

E. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

3.8 IDENTIFICATION

A. Identify exposed sanitary waste and vent piping. Comply with requirements for identification specified in Section 22 05 53 "Identification for Plumbing Piping and Equipment."

3.9 CLEANING AND PROTECTION

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

D. Exposed PVC Piping: Protect plumbing vents exposed to sunlight with two coats of water-based latex paint.

3.10 PIPING SCHEDULE

A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.

B. Aboveground, soil and waste piping NPS 4 and smaller shall be the following:

1. Hubless, cast-iron soil pipe and fittings; CISPI hubless-piping couplings; and coupled joints.
2. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.

C. Aboveground, soil and waste piping NPS 5 and larger shall be the following:

1. Hubless, cast-iron soil pipe and fittings; CISPI hubless-piping couplings; and coupled joints.
2. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.

D. Aboveground, vent piping NPS 4 and smaller shall be the following:

1. Hubless, cast-iron soil pipe and fittings; CISPI hubless-piping couplings; and coupled joints.
2. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.

E. Underground, soil, waste, and vent piping NPS 4 and smaller shall be any of the following:

1. Hubless, cast-iron soil pipe and fittings; CISPI hubless-piping couplings; and coupled joints.
2. Solid wall PVC pipe, PVC socket fittings, and solvent-cemented joints.

F. Underground, soil and waste piping NPS 5 and larger shall be the following:

1. Hubless, cast-iron soil pipe and fittings; CISPI hubless-piping couplings; coupled joints.
2. PVC pipe; PVC socket fittings; and solvent-cemented joints.

END OF SECTION 22 13 16

SECTION 22 33 00 - ELECTRIC, DOMESTIC-WATER HEATERS - (NATIONAL ACCOUNT)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Commercial, electric, storage, domestic-water heaters.
2. Domestic-water heater accessories.

1.3 ACTION SUBMITTALS

A. Product Data: For each type and size of domestic-water heater indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings:

1. Wiring Diagrams: For power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Domestic-Water Heater Labeling: Certified and labeled by testing agency acceptable to authorities having jurisdiction.

B. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For electric, domestic-water heaters to include in emergency, operation, and maintenance manuals.

1.6 QUALITY ASSURANCE

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.

B. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1.

C. ASME Compliance: Where ASME-code construction is indicated, fabricate and label commercial, domestic-water heater storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.

D. NSF Compliance: Fabricate and label equipment components that will be in contact with potable water to comply with NSF 61, "Drinking Water System Components - Health Effects."

1.7 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of electric, domestic-water heaters that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including storage tank and supports.
b. Faulty operation of controls.
c. Deterioration of metals, metal finishes, and other materials beyond normal use.

2. Warranty Periods: From date of Substantial Completion.

a. Commercial, Electric, Storage, Domestic-Water Heaters:

1) Storage Tank: Three years.
2) Controls and Other Components: Three years.

b. Compression Tanks: Five years.

PART 2 - PRODUCTS

2.1 COMMERCIAL, ELECTRIC, DOMESTIC-WATER HEATERS

A. Commercial, Electric, Storage, Domestic-Water Heaters:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings.
Standard: UL 1453.
2. Storage-Tank Construction: ASME-code, steel arrangement.

a. Tappings: Factory fabricated of materials compatible with tank and piping connections. Attach tappings to tank before testing.

1) NPS 2 and Smaller: Threaded ends according to ASME B1.20.1.
2) NPS 2-1/2 and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges, and according to ASME B16.24 for copper and copper-alloy flanges.

b. Pressure Rating: 150 psig.

c. Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending lining material into tappings.

3. Factory-Installed Storage-Tank Appurtenances:

a. Anode Rod: Replaceable magnesium.
b. Drain Valve: Corrosion-resistant metal complying with ASSE 1005.
c. Insulation: Comply with ASHRAE/IESNA 90.1.
d. Jacket: Steel with enameled finish.
e. Heating Elements: Electric, screw-in or bolt-on immersion type arranged in multiples of three.
f. Temperature Control: Adjustable thermostat.
g. Safety Controls: High-temperature-limit and low-water cutoff devices or systems.
h. Relief Valves: ASME rated and stamped for combination temperature-and-pressure relief valves. Include one or more relief valves with total relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select one relief valve with sensing element that extends into storage tank.

2.2 DOMESTIC-WATER HEATER ACCESSORIES

A. Domestic-Water Compression Tanks:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings.
2. Description: Steel pressure-rated tank constructed with welded joints and factory-installed butyl-rubber diaphragm. Include air precharge to minimum system-operating pressure at tank.
3. Construction:

a. Tappings: Factory-fabricated steel, welded to tank before testing and labeling. Include ASME B1.20.1 pipe thread.
b. Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
c. Air-Charging Valve: Factory installed.

B. Drain Pans: Corrosion-resistant metal with raised edge. Comply with ANSI/CSA LC 3. Include dimensions not less than base of domestic-water heater, and include drain outlet not less than NPS 3/4 with ASME B1.20.1 pipe threads or with ASME B1.20.7 garden-hose threads.

C. Heat-Trap Fittings: ASHRAE 90.2.

D. Pressure Relief Valves: ASME rated and stamped. Include pressure setting less than domestic-water heater working-pressure rating.

PART 3 - EXECUTION

3.1 DOMESTIC-WATER HEATER INSTALLATION

A. Commercial, Electric, Domestic-Water Heater Mounting: Install commercial, electric, domestic-water heaters on concrete base.

1. Exception: Omit concrete bases for commercial, electric, domestic-water heaters if installation on stand, bracket, suspended platform, or directly on floor is indicated.
2. Maintain manufacturer's recommended clearances.
3. Arrange units so controls and devices that require servicing are accessible.
4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
6. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
7. Install anchor bolts to elevations required for proper attachment to supported equipment.
8. Anchor domestic-water heaters to substrate.

B. Install electric, domestic-water heaters level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.

1. Install shutoff valves on domestic-water-supply piping to domestic-water heaters and on domestic-hot-water outlet piping.

C. Install water-heater drain piping as indirect waste to spill by positive air gap into open drains or over floor drains. Install hose-end drain valves at low points in water piping for electric, domestic-water heaters that do not have tank drains.

D. Install thermometers on outlet piping of electric, domestic-water heaters.

E. Install thermometers on inlet and outlet piping of electric, domestic-water heaters.

F. Assemble and install inlet and outlet piping manifold kits for multiple electric, domestic-water heaters. Fabricate, modify, or arrange manifolds for balanced water flow through each electric, domestic-water heater. Include shutoff valve and thermometer in each domestic-water heater inlet and outlet, and throttling valve in each electric, domestic-water heater outlet.

G. Fill electric, domestic-water heaters with water.

H. Charge domestic-water compression tanks with air.

3.2 CONNECTIONS

A. Comply with requirements for piping specified in Section 22 11 16 "Domestic Water Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

B. Where installing piping adjacent to electric, domestic-water heaters, allow space for service and maintenance of water heaters. Arrange piping for easy removal of domestic-water heaters.

3.3 IDENTIFICATION

A. Identify system components. Comply with requirements for identification specified in Section 22 05 53 "Identification for Plumbing Piping and Equipment."

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections.

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
2. Operational Test: After electrical circuitry has been energized, start units to confirm proper operation.
3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Electric, domestic-water heaters will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

3.5 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain commercial, electric, domestic-water heaters.

END OF SECTION 22 33 00

SECTION 22 41 00 - PLUMBING FIXTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Faucets.
2. Lavatories.
3. Water closets.
4. Toilet seats.
5. Supply fittings.
6. Waste fittings.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for lavatories.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: Include diagrams for power, signal, and control wiring.

PART 2 - PRODUCTS

2.1 FIXTURES

A. Fixtures shall be by specified manufacturer as indicated on the contract drawings.

B. Fixtures shall be complete with all appurtenances including trim, supplies, waste, trap, strainers, etc. All fixtures shall be of one manufacturer insofar as possible.

2.2 SUPPLY FITTINGS

A. NSF Standard: Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for faucet materials that will be in contact with potable water.

B. Standard: ASME A112.18.1/CSA B125.1.

C. Supply Fittings:

1. Supply Piping: Chrome-plated-brass pipe or chrome-plated-copper tube matching water-supply piping size. Include chrome-plated wall flange.

2. Stops: Chrome-plated-brass, one-quarter-turn, ball-type or compression stop with inlet connection matching water-supply piping type and size.

    a. Operation: Loose key.

3. Risers:

    a. Size: NPS 3/8 for lavatories.
    b. Material: Chrome-plated, soft-copper flexible tube riser.

2.3 WASTE FITTINGS

A. Standard: ASME A112.18.2/CSA B125.2.

B. Drain: Grid type with NPS 1-1/4 offset tailpiece for accessible lavatories.

C. Drain: Pop-up type with NPS 1-1/4 straight tailpiece as part of faucet for standard lavatories.

D. Trap:

1. Size: NPS 1-1/2 for lavatories.
2. Size: NPS 1-1/2 for.
3. Material: Chrome-plated, two-piece, cast-brass trap and swivel elbow with 0.032-inch- thick brass tube to wall; and chrome-plated-brass or -steel wall flange.
4. Material: Stainless-steel, two-piece trap and swivel elbow with 0.012-inch- thick stainless-steel tube to wall; and stainless-steel wall flange.
5. Material: ASTM F 409 ABS or PVC two-piece trap and waste to wall and wall flange.

2.4 GROUT

A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

B. Characteristics: Nonshrink; recommended for interior and exterior applications.

C. Design Mix: 5000-psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in of water-supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before plumbing-fixture installation.

B. Examine walls, floors, cabinets, and counters for suitable conditions where fixtures will be installed.

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

3.2 INSTALLATION

A. Install plumbing fixtures level and plumb according to roughing-in drawings.

B. Install floor-mounted water closets on closet flange attachments to drainage piping.

C. Install counter-mounting fixtures in and attached to casework.

D. Install pedestal lavatories on pedestals and secured to wood blocking in wall.

E. Install water-supply piping with stop on each supply to each fixture to be connected to water distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.

1. Exception: Use ball, gate, or globe valves if supply stops are not specified with fixture.

F. Install tanks for accessible, tank-type water closets with lever handle mounted on wide side of compartment.

G. Install toilet seats on water closets.

H. Install faucet flow-control fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.

I. Install traps on fixture outlets.

1. Exception: Omit trap on fixtures with integral traps.
2. Exception: Omit trap on indirect wastes unless otherwise indicated.

J. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible lavatories. Comply with requirements in Section 10 28 00 "Toilet, And Custodial Accessories”.

K. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 22 05 18 "Escutcheons for Plumbing Piping."

L. Seal joints between plumbing fixtures, counters, floors, and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Section 07 92 00 "Joint Sealants."

3.3 CONNECTIONS

A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

B. Comply with water piping requirements specified in Section 22 11 16 "Domestic Water Piping."

C. Comply with soil and waste piping requirements specified in Section 22 13 16 "Sanitary Waste and Vent Piping."

D. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible lavatories.

3.4 ADJUSTING

A. Operate and adjust plumbing fixtures and controls. Replace damaged and malfunctioning fixtures, fittings, and controls.

B. Adjust water pressure at faucets to produce proper flow.

3.5 CLEANING AND PROTECTION

A. After completing installation of plumbing fixtures, inspect and repair damaged finishes.

B. Clean plumbing fixtures, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.

C. Provide protective covering for installed plumbing fixtures and fittings.

D. Do not allow use of plumbing fixtures for temporary facilities unless approved in writing by Owner.

END OF SECTION 22 41 00

SECTION 23 00 10 – GENERAL HVAC REQUIREMENTS – (NATIONAL ACCOUNT)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract and Division 00 and 01 Specification Sections, apply to this Section.

B. Refer to Division 26 Electrical.

1.2 SUMMARY

A. Section Includes:

1. General HVAC Requirements.
2. The HVAC equipment is provided to Delhaize America, LLC as part of a National Account Agreement. Delhaize America, LLC shall purchase the equipment from SESCO dba MCNAMARA & Co. Contact SESCO at P.O. Box 667, Kernersville, NC 27285, phone (336) 996-2220 for bill of material, scope and services provided by SESCO.

1.3 DEFINITIONS

A. Contractor: Mechanical Contractor.

B. Cx: Commissioning.

C. CxA: Commissioning Agent/Authority.

D. TAB: Testing, Adjusting and Balancing.

1.4 PERFORMANCE REQUIREMENTS

A. The work required includes all labor, materials, equipment, appurtenances, services and supervision required to provide a complete heating, ventilating and air-conditioning system as shown on the drawings and specified in this Division and associated Divisions.

1. Complete heating, ventilating and air-conditioning systems as indicated on the drawings, including all accessories.
2. Codes, Permits, Inspection Fees, etc.: Refer to Div. 01 GENERAL REQUIREMENTS. All work shall be installed in complete accordance with State, Municipal and Local Codes. The Contractor shall obtain all necessary permits, licenses, etc. and pay for all inspections required by agencies having jurisdictional authority in connection with this work.

3. Inspections: A Delhaize America, LLC and/or SESCO representative will observe the job periodically. Checklists will be completed noting any items that will need to be corrected prior to the next visit. A copy of this inspection checklist shall go to the General Contractor, Mechanical Contractor, Construction Manager and Maintenance Supervisor.
4. Contractor's Qualifications: Delhaize America, LLC assumes and requires that the Contractor has had sufficient general knowledge and experience to anticipate the needs for a construction project of this nature. The Contractor shall furnish everything needed or required to complete the construction in accordance with reasonable interpretation of the intent of the drawings, specifications and any minor items required by code, law or regulations whether or not specified or specifically shown. This is not intended to cover any major items of equipment or labor not shown or specified and intended, but is intended and will be interpreted to cover the Contractor's full responsibility for providing all miscellaneous labor, parts, devices, accessories and appurtenances which are required or applicable and considered required in keeping with good practice for first-class workmanship, and a system which is complete and operable in every respect.
5. Workmanship: Skilled and experienced workmen in accordance with the best-accepted practices of the industry shall make the entire installation. Where codes are not specific as to workmanship, Delhaize America, LLC shall reserve the right in determining if the workmanship is substandard. If any workman is found to be failing in the correct performance of his work, he shall be removed from the job immediately. Delhaize America, LLC also reserves the right to cut refrigerant pipe fittings for verification that Nitrogen was used when fittings were soldered.

B. Drawings

1. Drawings show arrangement of the system desired and shall be followed as closely as practical. Because of the small scale of the drawings, not all offsets and bends can be shown; these shall be worked out on the job without extra charge to fully complete the intent of the plans. Should job conditions or substitution of equipment necessitate a rearrangement, prepare and submit for approval scaled drawings of such rearrangement before any work begins. If any party contemplating submitting a bid for the proposed contract is in doubt as to the true meaning of any part of these proposed Contract Documents, he may submit to Delhaize America, LLC a written request for an interpretation thereof. The person submitting the request will be responsible for its prompt and actual delivery. Any interpretation of such documents will be made only by the Addendum duly issued and a copy of such Addendum will be mailed to or delivered to each person receiving a set of such documents. Delhaize America, LLC will not be responsible for any other explanations or interpretations of such documents which anyone presumes to make on behalf of Delhaize America, LLC before expiration of the ultimate time set for the receipt of bids.
2. If work is shown and/or specified in such a manner as to make it impossible to produce first-class work, the Contractor shall request a written interpretation before proceeding with the work. If the Contractor fails to make such a request, no excuse will thereafter be entertained for failure to produce first-class work.
3. The drawings and specifications shall be considered as supplementary one to another, so that materials and labor indicated, called for or implied by the one and not the other, shall be supplied and installed as though specifically called for by both.

4. Should any conflict occur between drawings and specifications, the Contractor is deemed to have estimated on the more expensive way of doing the work, unless he has asked for and obtained a written decision by Addendum as to which method of work or material will be required before the submission of his proposal.

C. Cleaning

1. After the installation is complete, all equipment, ducts and plenums shall be thoroughly cleaned of all debris and blown free of all small particles of rubbish and dust and then shall be vacuum cleaned before installing outlet faces.
2. Equipment shall be wiped clean with all traces of oil, duct, dirt and/or paint spots removed.
3. Temporary filters shall be provided for all fans that are operated during construction and new filters shall be installed after all construction dirt has been removed from the building. Ducts, plenums and other specified equipment herein have been vacuum cleaned. It shall be the responsibility of the Contractor to maintain the system in this condition until final acceptance.

1.5 ACTION SUBMITTALS

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

1.6 QUALITY ASSURANCE

A. Warranty
1. The Mechanical Contractor shall be responsible for all labor, material, workmanship and installation by him under this section of the specifications and to correct any deficiencies adjudged by Delhaize America, LLC This guarantee shall extend for a period of not less than twelve (12) months from the date of the final project acceptance by Delhaize America, LLC, against any defects or system failure. All equipment manufacturers' warranties which extend beyond the first twelve (12) months shall be transferred to Delhaize America, LLC However, it shall be understood by all parties concerned that the manufacturers’ warranties pertain only to furnishing of material by the manufacturer and shall not include replacement labor costs and miscellaneous expenses unless otherwise described by the manufacturer. All labor to support warranty work on national account equipment is to be included in the HVAC sub-contractor’s price that is quoted to the General Contractor.

PART 2 - PRODUCTS

2.1 MATERIALS

A. All materials shall be new and shall bear the seal of the Underwriter’s Laboratories or ETL where National Electrical Standards are established for the type of material. The Contractor shall, within thirty (30) days of the award of the Contract, and prior to purchasing any material, furnish a list of the material he proposes to use, showing the manufacturer, model, type and catalog number. All material required for the complete

installation of the equipment shown on the drawings and specified herein shall be furnished by the Contractor. Delhaize America, LLC shall allow no substitutions of equipment for that specified and shown on the drawings without prior approval. Any proposed equipment substitution, including complete performance data and dimensional and weight information, shall be submitted at least ten (10) days prior to the bid date.

1. The Contractor shall contact SESCO dba McNamara & Co., P.O. Box 667, Kernersville, NC 27285, phone (336) 996-2220 with respect to obtaining material and equipment required for the air-conditioning systems and kitchen ventilation systems.

END OF SECTION 23 00 10

SECTION 23 05 29 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes:

1. Steel pipe hangers and supports.
2. Metal framing systems.
3. Thermal-hanger shield inserts.
4. Fastener systems.
5. Equipment supports.

B. See Division 5 for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.

C. See Division 13 for fire protection piping.

D. See Division 23 Section "Vibration and Seismic Controls for HVAC Piping and Equipment" for vibration isolation devices.

E. See Division 23 Section "Expansion Fittings and Loops for HVAC Piping" for pipe guides and anchors.

F. See Division 23 Sections "Metal Ducts" and "Nonmetal Ducts" for duct hangers and supports.

1.2 DEFINITIONS

A. Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports."

1.3 PERFORMANCE REQUIREMENTS

A. Design supports for multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.

B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

C. Design seismic-restraint hangers and supports for piping and equipment and obtain approval from authorities having jurisdiction.

1.4 ACTION SUBMITTALS

A. Product Data:

1. Steel pipe hangers and supports.
2. Metal framing systems.
3. Thermal-hanger shield inserts.
4. Powder-actuated fastener systems.

B. Welding certificates

1.5 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to ASME Boiler and Pressure Vessel Code: Section IX.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 STEEL PIPE HANGERS AND SUPPORTS

A. Description: MSS SP-58, Types 1 through 58, factory-fabricated components. Refer to Part 3 "Hanger and Support Applications" Article for where to use specific hanger and support types.

B. Manufacturers:

1. B-Line Systems, Inc.; a division of Cooper Industries.
2. Carpenter & Paterson, Inc.
3. ERICO/Michigan Hanger Co.
4. Grinnell Corp.
5. Tolco Inc.

C. Galvanized, Metallic Coatings: Pregalvanized or hot dipped.

D. Nonmetallic Coatings: Plastic coating, jacket, or liner.

E. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion for support of bearing surface of piping.

2.3 METAL FRAMING SYSTEMS

A. Description: MFMA-3, shop or field-fabricated pipe-support assembly made of steel channels and other components.

B. Manufacturers:

1. B-Line Systems, Inc.; a division of Cooper Industries.
2. ERICO/Michigan Hanger Co.; ERISTRUT Div.
3. Tolco Inc.
4. Unistrut Corp.; Tyco International, Ltd.

C. Coatings: Manufacturer's standard finish, unless bare metal surfaces are indicated.

D. Nonmetallic Coatings: Plastic coating, jacket, or liner.

2.4 THERMAL-HANGER SHIELD INSERTS

A. Description: 100-psig- minimum, compressive-strength insulation insert encased in sheet metal shield.

B. Manufacturers:

1. Carpenter & Paterson, Inc.
2. ERICO/Michigan Hanger Co.
3. Pipe Shields, Inc.

C. Insulation-Insert Material for Cold Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate or ASTM C 552, Type II cellular glass with vapor barrier.

D. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate or ASTM C 552, Type II cellular glass.

E. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

F. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

G. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.5 FASTENER SYSTEMS

A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

1. Manufacturers:

a. Hilti, Inc.
b. ITW Ramset/Red Head.
c. Masterset Fastening Systems, Inc.
d. MKT Fastening, LLC.
e. Powers Fasteners.

B. Mechanical-Expansion Anchors: Insert-wedge-type zinc-coated or stainless steel, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

1. Manufacturers:

a. B-Line Systems, Inc.; a division of Cooper Industries.
b. Empire Industries, Inc.
c. Hilti, Inc.
d. ITW Ramset/Red Head.
e. MKT Fastening, LLC.
f. Powers Fasteners.

2.6 EQUIPMENT SUPPORTS

A. Description: Welded, shop or field-fabricated equipment support made from structural-steel shapes.

2.7 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.
1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT APPLICATIONS

A. Specific hanger and support requirements are specified in Sections specifying piping systems and equipment.

B. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized, metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

1. Contractor’s Option 1: Provide felt-lined pipe insulator or elastomeric pipe clamp cushion where ferrous attachments are in direct contact with copper tubing.

2. Contractor's Option 2: Wrap copper tubing with not less than two layers of 10 mil thick black plastic tape extending to a minimum of 1 inch on each side of clamp.

E. Use padded hangers for piping that is subject to scratching.

F. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, NPS 1/2 to NPS 30.
2. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes, NPS 3/4 to NPS 24, requiring clamp flexibility and up to 4 inches of insulation.
3. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8.
4. U-Bolts (MSS Type 24): For support of heavy pipes, NPS 1/2 to NPS 30.
5. Pipe Saddle Supports (MSS Type 36): For support of pipes, NPS 4 to NPS 36, with steel pipe base stanchion support and cast-iron floor flange.
6. Single Pipe Rolls (MSS Type 41): For suspension of pipes, NPS 1 to NPS 30, from 2 rods if longitudinal movement caused by expansion and contraction might occur.
7. Complete Pipe Rolls (MSS Type 44): For support of pipes, NPS 2 to NPS 42, if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.

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

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

H. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.

I. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. Top-Beam C-Clamps (MSS Type 19): For support of pipes to NPS4, under roof installations with bar-joist construction to attach to top flange of structural shape. Provide retaining strap.
3. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.

4. C-Clamps (MSS Type 23): For support of pipes to NPS 4, attached to structural shapes. Provide retaining strap.
5. Welded-Steel Brackets: For support of pipes from below, or for suspending from above by using clip and rod. Use one of the following for indicated loads:

    a. Light (MSS Type 31): 750 lb.
    b. Medium (MSS Type 32): 1500 lb.
    c. Heavy (MSS Type 33): 3000 lb.

6. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.

J. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

K. Comply with MSS SP-69 for trapeze pipe hanger selections and applications that are not specified in piping system Sections.

L. Comply with MFMA-102 for metal framing system selections and applications that are not specified in piping system Sections.

M. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

3.2 HANGER AND SUPPORT INSTALLATION

A. Steel Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.

B. Metal Framing System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled metal framing systems.

C. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

D. Fastener System Installation:

1. Install powder-actuated fasteners in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual. Do not use in lightweight concrete or concrete slabs less than 4 inches thick.
2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions. Do not use in lightweight concrete or concrete slabs less than 4 inches thick.

E. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.

F. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

G. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

H. Install lateral bracing with pipe hangers and supports to prevent swaying.

I. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

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

K. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.1 (for power piping) and ASME B31.9 (for building services piping) are not exceeded.

L. Insulated Piping: Comply with the following:

1. Attach clamps and spacers to piping.

    a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
    b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
    c. Do not exceed pipe stress limits according to ASME B31.1 for power piping and ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
4. Shield Dimensions for Pipe: Not less than the following:

    a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
    b. NPS 4: 12 inches long and 0.06 inch thick.
    c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
    d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
    e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.

5. Pipes NPS 8 and Larger: Include wood inserts.
6. Insert Material: Length at least as long as protective shield.
7. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.3 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment and make smooth bearing surface.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.4 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and 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. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

3.5 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

3.6 PAINTING

A. Touch Up: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.

Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 23 05 29

SECTION 23 05 93 - TESTING, ADJUSTING, AND BALANCING FOR HVAC – (NATIONAL ACCOUNT)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract and Division 01 Specification Sections, apply to this Section.

B. Related Sections: 23 08 00 Commissioning of HVAC

1.2 SUMMARY

A. Section Includes:

1. Balancing Air Systems:

a. Constant-volume air systems.

2. Contractor’s responsibility preparing for and assisting the TAB contractor.

1.3 DEFINITIONS

A. AABC: Associated Air Balance Council.

B. Cx: SESCO Commissioning

C. CxA: SESCO Commissioning Agent

D. Contractor: Mechanical Contractor

E. NEBB: National Environmental Balancing Bureau.

F. OA: Outside Air

G. RA: Return Air

H. SA: Supply Air

I. TAB: Testing, adjusting, and balancing.

J. TABB: Testing, Adjusting, and Balancing Bureau.

K. TAB Specialist: An entity engaged to perform TAB Work.

1.4 INFORMATIONAL SUBMITTALS

A. Certified TAB reports.

1.5 QUALITY ASSURANCE

A. The TAB shall be provided by SESCO as part of the Commissioning requirements.

B. The Contractor shall provide qualified service assistance during the TAB work to enable the system operation, correct performance deficiencies and make the necessary adjustments, such as fan sheave adjustment.

C. TAB Report Forms: Use standard SMACNA, NEBB, AABC, TABB or other standard forms approved by Construction Manager and Commissioning Authority.

1.6 PROJECT CONDITIONS

A. The TAB work shall be completed and any reported deficiencies rectified prior to the Grand Opening deadline.

B. Partial Owner Occupancy: Owner may occupy completed areas of building before Substantial Completion. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

1.7 COORDINATION

A. General Contractor and Mechanical Contractor are to provide two week’s advance notice for each inspection required by SESCO. Include scheduled test dates and times in writing to SESCO, fax: (336) 996-3360 email: sescocx@trs-sesco.com.

B. Perform corrective actions as directed after TAB leakage tests and duct inspection on air distribution systems have been satisfactorily completed.

C. The Contractor shall coordinate start-up, operation and evaluation of the heating, ventilating and air conditioning systems with Food Lion. The work covered in this section shall consist of (1) initial check, test and start-up, (2) heating performance evaluation, (3) cooling/dehumidification performance evaluation. The Contractor shall provide qualified service personnel during these phases of work. Verification of startup shall be determined by SESCO. Three additional seasonal evaluation periods may be required to complete the work during the first year of store operation. Prior to the initial start-up, the Contractor shall complete prestart equipment checklist provided by this specification. The completed prestart checklist shall be returned to SESCO and copied to Food Lion Construction Representative a minimum of 10 days prior to the initial start.

D. Extra inspections requiring additional time or expense relating to Contractor deficiencies or lack of scheduling, due to no fault of SESCO or Food Lion, shall be the

responsibility of the Contractor at the rate of $85 per man hour, current IRS mileage allowance, plus lodging and expenses, as required.

PART 2 - EXECUTION

2.1 Food Lion requires the use of a certified independent air balance contractor, as provided by SESCO. SESCO may verify performance via random diffuser volume checkout using the TAB contractor's instruments.

2.2 GENERAL PROCEDURES FOR TESTING AND BALANCING

A. Air-handling and distribution system, supply, return and exhaust shall be balanced and adjusted. Maximum air quantities at each outlet or inlet shall not vary more than -5% to +10% from those values indicated on the mechanical drawings. A report of final tests, per SMACNA standards, giving fan rpm, airflow (cfm) at each outlet, duct pressure readings, air-handling unit SA/RA/OA duct traverse and other pertinent operating data shall be submitted. After completion of balancing, the entire HVAC system shall be re-adjusted, as necessary, under specified operating conditions.

B. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.

C. Take and report testing and balancing measurements in inch-pound (IP) units.

D. All testing penetrations shall be sealed air-tight. Coordinate method with SESCO.

2.3 FINAL REPORT

A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems. Electronic copies of the complete test reports shall be submitted to SESCO for approval prior to final acceptance of the project. Sample test report forms may be requested from SESCO.

1. Include a certification sheet at the front of the report signed and sealed by the certified testing and balancing engineer.
2. Include a list of instruments used for procedures, along with proof of calibration within twelve (12) months of use.

B. General Report Data: In addition to form titles and entries, include the following data:

1. Title page.
2. Name and address of the TAB contractor.
3. Project name.
4. Project location.
5. Architect's name and address.
6. Engineer's name and address.

7. Contractor's name and address.
8. Report date.
9. Signature of TAB supervisor who certifies the report.
10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
11. Summary of contents including the following:

    a. Specified versus final performance.
    b. Notable characteristics of systems.

12. Notes to explain why certain final data in the body of reports vary from indicated values.
13. Test conditions for fan performance forms including the following:

    a. Settings for outdoor- and return--air dampers.
    b. Conditions of filters.
    c. Cooling coil, wet- and dry-bulb conditions (entering and leaving).
    d. Bypass damper settings at coils.
    e. Fan drive settings including settings and percentage of maximum pitch diameter.
    f. Other system operating conditions that affect performance.

C. Air-Handling-Unit Test Reports: For air-handling units with coils, include the following:

1. Unit Data:

    a. Unit identification.
    b. Location.
    c. Make and type.
    d. Model number and unit size.
    e. Manufacturer's serial number.
    f. Sheave make, size in inches, and bore.
    g. Center-to-center dimensions of sheave, and amount of adjustments in inches.
    h. Number, make, and size of belts.
    i. Number, type, and size of filters.

2. Motor Data:

    a. Motor make, and frame type and size.
    b. Horsepower and rpm.
    c. Volts, phase, and hertz.
    d. Full-load amperage and service factor.
    e. Sheave make, size in inches, and bore.
    f. Center-to-center dimensions of sheave, and amount of adjustments in inches.

3. Test Data (Indicated and Actual Values):

    a. Total air flow rate in cfm.
    b. Total system static pressure in inches wg.

c. Fan rpm.
d. Discharge static pressure in inches wg.
e. Filter static-pressure differential in inches wg.
f. Cooling-coil static-pressure differential in inches wg.
g. Heating-coil static-pressure differential in inches wg.
h. Outdoor airflow in cfm.
i. Return airflow in cfm.
j. Outdoor-air damper position.
k. Return-air damper position.

D. Apparatus-Coil Test Reports:

1. Coil Data:

a. System identification.
b. Location.
c. Coil type.
d. Number of rows.
e. Make and model number.
f. Face area in sq. ft.

E. Gas Heat Apparatus Test Reports: In addition to manufacturer's factory startup equipment reports, include the following:

1. Unit Data:

a. System identification.
b. Location.
c. Make and type.
d. Model number and unit size.
e. Manufacturer's serial number.

2. Test Data (Indicated and Actual Values):

a. Total air flow rate in cfm.
b. Entering-air temperature in deg F.
c. Leaving-air temperature in deg F.
d. Air static-pressure differential in inches wg.
e. Manifold pressure in psig.

F. Electric-Coil Test Reports: For electric furnaces, duct coils, and electric coils installed in central-station air-handling units, include the following:

1. Unit Data:

a. System identification.
b. Location.
c. Coil identification.
d. Capacity in Btu/h.
e. Number of stages.
f. Connected volts, phase, and hertz.

g. Rated amperage.
h. Air flow rate in cfm.

2. Test Data (Indicated and Actual Values):

a. Air flow rate in cfm.
b. Entering-air temperature in deg F.
c. Leaving-air temperature in deg F.
d. Voltage at each connection.
e. Amperage for each phase.

G. Fan Test Reports: For supply and exhaust fans, include the following:

1. Fan Data:

a. System identification.
b. Location.
c. Make and type.
d. Model number and size.
e. Manufacturer's serial number.
f. Sheave make, size in inches, and bore.
g. Center-to-center dimensions of sheave, and amount of adjustments in inches.

2. Motor Data:

a. Motor make, and frame type and size.
b. Horsepower and rpm.
c. Volts, phase, and hertz.
d. Full-load amperage and service factor.
e. Sheave make, size in inches, and bore.
f. Center-to-center dimensions of sheave, and amount of adjustments in inches.
g. Number, make, and size of belts.

3. Test Data (Indicated and Actual Values):

a. Total airflow rate in cfm.
b. Total system static pressure in inches wg.
c. Fan rpm.
d. Discharge static pressure in inches wg.
e. Suction static pressure in inches wg.

H. Round and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:

1. Report Data:

a. System and air-handling-unit number.
b. Location and zone.
c. Duct static pressure in inches wg.

d. Duct size in inches.
e. Duct area in sq. ft..
f. Indicated air flow rate in cfm.
g. Indicated velocity in fpm.
h. Actual air flow rate in cfm.
i. Actual average velocity in fpm.

I. Instrument Calibration Reports:

1. Report Data:

a. Instrument type and make.
b. Serial number.
c. Application.
d. Dates of use.
e. Dates of calibration.

2.4 INSPECTIONS

A. Initial Inspection:

1. After testing and balancing are complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance readings documented in the final report.
2. Check the following for each system:

a. Measure airflow of at least 10 percent of air outlets.
b. Measure room temperature at each thermostat/temperature sensor. Compare the reading to the set point.
c. Verify that balancing devices are marked with final balance position.
d. Note deviations from the Contract Documents in the final report.

3. SESCO will provide the deficiency report to Food Lion Construction Representative and the General Contractor. The report will list deficiencies that shall be corrected as required by SESCO CxA and/or the Food Lion Construction Representative.

B. Final Inspection:

1. After initial inspection is complete and documentation by random checks verifies that testing and balancing are complete and accurately documented in the final report, request that a final inspection be made by SESCO CxA.

C. Prepare test and inspection reports.

END OF SECTION 23 05 93

SECTION 23 08 00 – COMMISSIONING OF HVAC – (NATIONAL ACCOUNT)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract and Division 01 Specification Sections, apply to this Section.

B. Related Sections: 23 08 93 Testing, Adjusting and Balancing for HVAC

1.2 SUMMARY

A. Section Includes:

A. Commissioning of HVAC equipment:

a. Constant-volume air systems, split-systems and packaged RTU's.

B. Commissioning of Energy Management System.

C. Contractor's responsibility preparing for and assisting the CxA.

1.3 DEFINITIONS

A. Contractor: Mechanical Contractor.

B. Cx: Commissioning.

C. CxA: Commissioning Agent or Authority.

D. EMS: Energy Management System.

E. TAB: Testing, adjusting, and balancing.

1.4 INFORMATIONAL SUBMITTALS

A. Cx reports.

1.5 QUALITY ASSURANCE

A. The Cx shall be provided by SESCO as part of a National Account agreement with Food Lion.

B. The Contractor shall provide qualified service assistance during the Cx work to enable the system operation, correct performance deficiencies and make any necessary adjustments.

C. Cx Report Forms: Refer to the end of this section for Food Lion approved Cx Report Forms and checklists.

1.6 PROJECT CONDITIONS

A. The Cx work shall be completed and any reported deficiencies rectified prior to the Grand Opening deadline. Completion of deficiencies is the responsibility of the Contractor.

B. Partial Owner Occupancy: Owner may occupy completed areas of building before Substantial Completion. Cooperate with Owner during Cx operations to minimize conflicts with Owner's operations.

1.7 COORDINATION

A. Notice: The Contractor shall notify the General Contractor when systems are installed and ready for inspection. The G.C. and the Contractor are to provide two (2) week's advance notice in writing for each inspection to SESCO. Include scheduled test dates and times. Contact SESCO Cx Scheduler at (336) 996-2220 or via email at sescocx@trs-sesco.com.

B. Refer to PART 3 – EXECUTION for specific work requirements.

C. Extra inspections beyond follow up report requiring additional time or expense relating to Contractor deficiencies or lack of scheduling, due to no fault of SESCO or Food Lion, shall be the responsibility of the Contractor at the rate of $85 per man hour, current IRS mileage allowance, plus lodging and expenses, as required. SESCO shall invoice the G.C. to recover this cost.

PART 2 - PRODUCTS

2.1 Food Lion shall contract the Cx work through SESCO as part of a National Account agreement. SESCO shall provide installation inspections, EMS checkout, site reports, TAB and the final Cx report to the Food Lion Construction Representative and the G.C.

PART 3 - EXECUTION

3.1 CONTRACTOR RESPONSIBILITY

A. The Contractor is required to provide adequate notice, as identified in section 23 08 00.3.2.

B. The Contractor shall have qualified personnel on site and available to attend all Cx activities.

3.2 GENERAL PROCEDURES FOR COMMISSIONING

A. Duct Inspection: The Contractor shall notify SESCO upon reaching approximately 80% of the duct installation. SESCO will inspect the ductwork installation and sealant application. A deficiency report, if necessary, will be sent to the Food Lion Construction Manager and the G.C. for review and action. The Contractor shall notify SESCO upon resolution of the noted deficiency items and to schedule a follow-up inspection.

B. Refrigerant Piping & Vacuum Micron Verification: The Contractor shall notify SESCO once each HVAC refrigerant circuit has been properly piped, pressure tested and evacuated to 500 microns or less. The Contractor must demonstrate that each circuit holds 500 microns for a period of three (3) hours with vacuum pumps off. The duct-inspection follow-up inspection, if necessary, will be completed at this time, as well. Food Lion also reserves the right to cut refrigerant pipe fittings for verification that Nitrogen was used when fittings were soldered.

C. HVAC System Start-Up: SESCO will verify the equipment start-up. Equipment start-up shall be by the Contractor or a factory authorized technician provided by the Contractor. It is the responsibility of the Contractor to provide a qualified technician to perform the equipment start-up. All necessary tools, equipment and materials required for the proper start-up and operation of the equipment shall be provided by the Contractor. The Contractor shall properly charge the HVAC refrigeration system, as required, set the HVAC refrigerant superheat and record the required data onto the HVAC Functional Performance Report. Refer to the end of this section for report forms.

D. EMS Checkout: SESCO will coordinate the final Energy Management System checkout with the G.C., the E.C. and the Contractor. This shall also include any required programming changes and/or calibrations to be made by SESCO.

E. Testing, Adjusting and Balancing (TAB): SESCO will coordinate the TAB with the G.C. and the third-party TAB contractor. The contractor shall have personnel present on site and available to assist the TAB contractor with the operation of the equipment. Refer to section 23 08 93 Testing, Adjusting and Balancing for HVAC.

3.3 REPORTS

A. Deficiency Report: SESCO will provide a list of deficiencies discovered during the routine inspections. The Contractor shall correct the deficiencies and report the same to SESCO for verification within two (2) weeks of issuance of the report. SESCO will return to inspect the corrected deficiencies. Should the corrections be improper, substandard or not performed altogether, any subsequent return trips required by SESCO will be charged to the G.C. for time and expenses, as noted above in section 23 08 00.1.7.C.

B. Final Cx Report – Upon completion of the project, a final Cx report, including the final TAB report, will be submitted to the Food Lion Construction Manager for review. The G.C. and the Contractor will be sent a copy of the report for their use and records. SESCO will follow up with the Food Lion Construction Manager for final acceptance. If all outstanding deficiencies have been completed to the satisfaction of the Food Lion Construction Manager and the G.C. or remain acceptable to both of these parties, a project close-out letter will be sent to the Food Lion Construction Manager and the G.C.

3.4 COMMISSIONING FORMS

Date:_____Contractor:_____ _____
RE: HVAC Agreement – FOOD LION STORE NUMBER._____

The H.V.A.C commissioning service for this project consists of the following general items:

- Date _____, Inspection of ductwork construction, sealing and installation methods.
- Date _____, Completion of Duct Work, Micron Verification, Fittings Cut and Nitrogen Pressure tested to be done by FL Representative.
- Date _____, Condensing Unit start and checkout, All Hoods, RTU'S, and Other mechanical items complete.
- Date _____, Airside Test and Balance for completed duct and AHU installation
- Date _____, Energy Management Checkout.

The sequence of inspection and requirements for the program are as follows:

1. First Visit: A SESCO field technician must be scheduled by the General Contractor to inspect ductwork prior to the start of duct insulation on project.
2. Second Visit: Condensing unit must be wired, pressure tested, and evacuated to 500 microns as per Food Lion specifications and all work associated with the second visit checklist below prior to SESCO technician's arrival for the second visit. A Food Lion representative must sign off on the Pressure Test and Fittings Cutting for nitrogen check, SESCO will verify Micron Test to ensure warranty compliance.
3. Third Visit: Condensing unit must BE started and charged properly and all items on the pre-start and startup checklist complete and signed by the start up mechanical technician. A Food Lion representative must sign off on the Startup Checklist to ensure warranty compliance.
4. Final Visit: The TAB 'Pre-Test and Balance Checklist' will be sent to the General Contractor. All items must be filled out, completed and FAXED back for scheduling of technician. A confirmed TAB date will be acknowledged via FAX confirming the actual TAB date. To avoid a return trip charge, the mechanical contractor is to have personnel available on site to correct any problems that may be discovered during the TAB.
5. EMS Visit: This visit is coordinated through SESCO and requires that both the Mechanical and Electrical contractors are ready for inspection.

The General Contractor and Mechanical Contractor must sign and date this copy at each requested check-off interval. This form must then be faxed to the SESCO office at 336-996-3360 for each of the above visits to be scheduled. SESCO will then have 5 business days from the date entered above to inspect items listed on the following check sheets. If any of the scheduled visits are unable to be finished due to non-compliance, a return trip charge must be paid by the General Contractor in the amount of labor and expenses necessary to re-schedule the visit.

Print Name / Signature (General Contractor) / Date

Print Name / Signature (Mechanical Contractor) / Date

FIRST SCHEDULED COMMISIONING VISIT

STORE: _____

CHECK POINTS	**AHU-1**	**AHU-2**	**AHU-3**	**O/A**
EQUIPMENT INSPECTION				
Air Handling Units	___	___	___	___
Condensing Units	___	___	___	___
Environmental Control Panel	___	__	__	__
Electrical Duct Heaters	___	___	___	__
SETTING AND SUPPORTING EQUIPMENT				
AIR HANDLER HUNG AND SUPPORTED FL SPEC BOOK AND PRINTS	___	___	___	___
DUCT WORK				
DUCT WORK INSTALL AND SUPPORTED PER FL. SPECS AND PRINTS	___	___	___	___
ALL MANUAL VOLUME DAMPERS INSTALLED PER PRINTS	___	___	___	___
ALL AIR MONITOR UNITS, INCLUDING GAUGES INSTALLED PER PRINTS	___	___	___	___
DOUBLE THICKNESS TURNING VANES OF THE SAME GAUGE AS DUCTWORK INSTALLED IN ALL 90 DEG ELBOWS	___	___	___	___
ALL LONGITUDINAL SEAMS TO BE PITTSBURGH LOCK AND SEALED	___	___	___	___
ALL TAKEOFFS TO BE 45DEG. METAL RECTANGULAR TO ROUND TRANSITION, **NO SPIN INS**.	___	___	___	___
ALL LONGITUDINAL AND NON-GASKET TRAVERSE JOINTS SEALED WITH UNITED MCGILL DUCT SEALER	___	___	___	___
ALL DUCTWORK CLEAN AND FREE OF DEBRIS	___	___	___	___
ALL TRAVERSE JOINTS TO BE EITHER DUCTMATE OR WARD	___	___	___	___

NOTE: ITEMS NOT COMPLETE

_____
_____
_____
_____
_____
_____

MECHANICAL CONTRACTOR: **COMMISIONING REPRESENTATIVE:** _____

SECOND SCHEDULED COMMISIONING VISIT

STORE# ___

CHECK POINTS	**AHU-1**	**AHU-2**	**AHU-3**	**O-A UNIT**
DUCT WORK				

ALL TAKEOFFS TO BE 45DEG. METAL RECTANGULAR TO ROUND TRANSITION, NO SPIN-INS	___	___	___	___
FLEXIBLE DUCT OF PROPER COMPOSITION, LENGTH AND INSTALLED AS SPECIFIED	___	___	___	___
ALL DUCTWORK COMPLETED AND PROPERLY INSULATED PER SPEC'S	___	___	___	___
ENSURE ALL DIFFUSERS ARE ARE INSTALLED IN PROPER LOCATION	___	___	___	___
ALL AIR MONITORS AND METERS INSTALLED, METERS LOCATED SO THEY CAN BE VIEWED FROM BACK ROOM FLOOR	___	___	___	___
SETTING AND SUPPORTING				
MAIN CONDENSING UNITS BOLTED OR WELDED TO STEEL AND WELDS PAINTED	___	___	___	___
ALL ACCESS DOORS ACCESSIBLE AND NOT BLOCKED	___	___	___	___
REFRIGERANT PIPING				
REFRIGERANT LINES INSTALLED AND SECURED PROPERLY	___	___	___	___
REFRIGERANT LINES INSULATED PER SPEC, UN-SPLIT 1/2"THICK ARMA-FLEX INSULATION, SEALED	___	___	___	___
REFRIGERANT SPECIALTIES, INVENTORIED, PROPERLY FITTED AND INSTALLED	___	___	___	___
NITROGEN USED				
2 FITTINGS CUT AND CHECKED TO BE FREE OF OXIDATION, IF OXIDIZED CUT 2 MORE				
NOTE: OWNER REPRESENTATIVE RESERVES THE RIGHT TO CHECK	___	___	___	___
PRESSURE TESTED				
OWNER TO INSPECT				
SYSTEM TO BE NITROGEN PRESSURE TESTED TO A MIN. OF 200psi FOR 24hrs	___	___	___	___
Initial charge	___	___	___	___
24hr verification	___	___	___	___

FILTERS INSTALLED	**AHU-1**	**AHU-2**	**AHU-3**	**O-A UNIT**
AFTER SYSTEM IS PRESSURE TESTED LIQUID AND SUCTION FILTERS NEED TO BE INSTALLED	___	___	___	___

MICRON CHECK
SESCO to inspect

SYSTEM HELD 500 MICRONS FOR 3 HRS STAGE 1 ___ ___ ___ ___

STAGE 2 ___ ___ ___ ___

HOLDING CHARGE

AFTER MICRONS VERIFIED A HOLDING CHARGE OF REFRIGERANT ADDED UNTIL START-UP ___ ___ ___ ___

RTU'S

ALL RTU'S SET TO CURB AND SECURED ___

DUCT WORK COMPLETE, INSULATED AND INSTALLED PER SPEC ___

HOODS AND EXHAUST FANS

MOUNTED, INSTALLED AND SECURED PER SPEC/ WORKING AND WIRING COMPLETE/ SWITCHES WORKING ___

MECHANICAL ROOM EXHAUST FANS AND DAMPERS PROPERLY MOUNTED AND SECURED/CONTROLLED AND WORKING ___

NOTE OBTAIN START UP DATE: _____

SCHEDULED RETURN DATE: _____

NOTE: ITEMS NOT COMPLETE

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

MECHANICAL CONTRACTOR: **COMMISIONING REPRESENTATIVE:** _____

FINAL CHECK, TEST, AND START DATA

NOTE: THIS MUST BE COMPLETED BY THE MECHANICAL CONTRACTOR DURING START-UP. SESCO WILL VERIFY.

STORE# _____

CITY, STATE _____

ITEM	**CHECK POINTS BEFORE START**			
Condensing Unit	**AHU-1**	**AHU-2**	**AHU-3**	**O-A UNIT**
Condenser Fan Rotation Correct	___	___	___	___
Crankcase Heaters Operating	___	___	___	___
Oil Level Satisfactory	___	___	___	___
All Electrical Connections Tight	___	___	___	___
Refrigerant Piping Installed Correctly	___	___	___	___
Air Handler				
Fan Rotation Correct	___	___	___	___
Tighten Blower Wheel, Main Bearing Bolts, Pulleys	___	___	___	___
Belt Tension/Alignment Correct	___	___	___	___
Condensate Drain Installed Per print	___	___	___	___
Clean Filters Installed/ **FILTERS MUST BE CHANGED BEFORE TEST AND BALANCE**	___	___	___	___
Expansion Valve Bulb Installed Correctly	___	___	___	___
Expansion Valve Equalizer Installed Correctly	___	___	___	___
Oil Traps Properly Installed	___	___	___	___
Environmental Control Panel				
All Electrical Connections Tight	___	___	___	___
Verify heating and cooling Stages	___	___	___	___
Verify dehumidification Staging	___	___	___	___
Temperature Sensor Calibrated	___	___	___	___
Humidity Sensor Calibrated	___	___	___	___
Duct Heater				
Air Flow Direction Correct	___	___	___	___
All Control wiring complete	___	___	___	___
All Electric/Gas Connections Tight	___	___	___	___

ITEM	CHECK POINTS AFTER START			
Condensing Unit				
Operating Oil Pressure	___	___	___	___
Crankcase Oil Level Satisfactory and clean	___	___	___	___
Oil Pressure Safety Control Checked	___	___	___	___

MECHANICAL CONTROL SETPOINTS MUST BE SET WITH GAUGE

High Pressure Control Checked	___	___	___	___

R-22 CUT OUT-325 PSIG

R-410 CUT OUT- PSIG

Low Pressure Control Adjusted	___	___	___	___

R-22
RECIPICATING CUT IN-20 PSIG
RECIPICATING CUT OUT- 5 PSIG
SCROLL CUT IN – 70 PSIG
SCROLL CUT OUT – 45 PSIG
NOTE: SET SHORT CYCLE COMPRESSOR TIME DELAYS TO 30 SECONDS.

R-410
CUT IN- 80 PSIG
CUT OUT- 50 PSIG

Fan Control Adjusted and Siliconed	___	___	___	___

FIRST FAN AHU-1
- ☐ CUT IN WITH COMPRESSOR START

SECOND FAN
- ☐ 70 DEGREES

THIRD FAN
- ☐ 75 DEGREES

FOURTH FAN
- ☐ 80 DEGREES

O/A UNIT
CUT IN WITH COMPRESSOR START

SECOND FAN
65 DEGREES

THIRD FAN
70 DEGREES

FOURTH FAN
75 DEGREES

DATA	AHU-1	AHU-2	AHU-3	0A UNIT
Condensing Unit Voltage L1	___	___	___	___
Voltage L2	___	___	___	___
Voltage L3	___	___	___	___
Suction Pressure, psig	___	___	___	___
Discharge Pressure, psig	___	___	___	___
Oil Pressure, psig	___	___	___	___

	AHU-1	AHU-2	AHU-3	OA UNIT
Environmental Controls Operating Properly	___	___	___	___
Final Leak Test Completed	___	___	___	___
Systems Charged Correctly, No Flashing	___	___	___	___
Compressor Service Valves Back Seated Packing Nuts Tightened, And Caps Replaced	___	___	___	___
Check Sight-glasses For Moisture	___	___	___	___
Air Handler				
Expansion Valve Superheat Adjusted to 15 deg.	___	___	___	___
Environmental Control Checkout				
Cooling Cycle Operates Properly	___	___	___	___
Heating Cycle Operates Properly	___	___	___	___
Dehumidification Cycle Operates Properly	___	___	___	___
Set points Per FL Set point Guide	___	___	___	___
TEMP SENSORS AND HUMIDITY Sensor MOUNTED AND CALIBRATED	___	___	___	___
Duct Heater				
Air Flow Control Operates	___	___	___	___
Contactors Staging Properly	___	___	___	___

ITEM **EQUIPMENT DATA PLATE INFORMATION**

DATA MUST BE FILLED OUT BY MECHANICAL CONTRACTOR

	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER
AHU-1 Condensing Unit	_____	_____	_____
Compressor, 1ST STAGE	_____	_____	_____
Compressor, 2ND STAGE	_____	_____	_____
Compressor, 3RD STAGE	_____	_____	_____
Compressor, 4TH STAGE	_____	_____	_____
Air Handler	_____	_____	_____
Fan Motor	_____	_____	_____

AHU-2 Condensing Unit			
Compressor, 1ST STAGE			
Compressor, 2ND STAGE			
Compressor, 3RD STAGE			
Compressor, 4TH STAGE			
Air Handler			
Fan Motor			
AHU-3 Condensing Unit			
Compressor, 1ST STAGE			
Compressor, 2ND STAGE			
Compressor, 3RD STAGE			
Compressor, 4TH STAGE			
Air Handler			
Fan Motor			
DELI ROOF TOP UNIT			
Compressor, 1ST STAGE			
Compressor, 2ND STAGE			
Fan Motor			
FRONT ROOF TOP UNIT			
Compressor, 1ST STAGE			
Compressor, 2ND STAGE			
Fan Motor			
OTHER ROOF TOP UNIT			
Compressor, 1ST STAGE			
Compressor, 2ND STAGE			
Fan Motor			
Environmental Control Panel			
Duct Heater			

Authorized Signature _____

Service Company _____

Installer _____
_____
_____

Start-Up Date _____

EMS CHECKOUT

DATE: _____ STORE # _____ CITY: _____

Completed by: _____ STATE: _____

HVAC Contractor _____ Electrical Contractor: _____

Primary type of aux heat: Gas/Elect		Type of energy management system: SEC/BEC/BX? If Other Specify:		Version:	

ENERGY MANAGEMENT

Parking Lot Lighting Section:

PARKING LOT LIGHTING CONTROLLED BY SEC/BEC/BX/HOUSE?

If SEC/BEC/BX Complete the information below:

Are there separate P/L Security Lights?		Number of P/L Security lights heads:		Times 5 amps:		Total P/L lighting Amps =
Are the Security Light locations per plan/spec?		Less Security lights, # P/L lights heads:		Times 5 amps:		
Light level sensor operation:	Lowest Reading:	Highest Reading:		Light level Location is Correct?		

All P/L Lighting is using light level sensor:

EMS Communication Wiring Section: Answer with Yes / No or N/A

	EMS:		A:		B:		C:		D:	
COM-C is installed, connected and verified to all racks and EMS:										
COM-B is installed, connected and verified to all racks, EMS and HalCom:	EMS:		A:		B:		C:		D:	
Host network is properly assigned to all Racks and EMS. A-1, B-2, C-3, D-4 and EMS-5	EMS:		A:		B:		C:		D:	
Unit numbers are properly assigned to all Racks and EMS. A-1, B-2, C-3, D-4 and EMS-5	EMS:		A:		B:		C:		D:	

2 Rack configuration. A-Rack is the Medium Temp Rack. B-Rack is the Low Temp Rack. EMS Panel is Always 5.

E2 Stores: CAT5 Cable is run from each controller to EMS panel Router:	EMS:		A:		B:		C:		D:	
CAT-5 Cable is run from the front office Port 19 to the Router/SS-100				Remote Communications is verified through the SS-100/Router.						
Phone line is run from the telephone backboard to the EMS Panel				Remote Communications is verified through the phone line:						
Verified Time and Date:		Verified Holidays:		Verified Daylight Savings Time is Manual and Dates: **BEC/RMCC**						
Alarm Network is online and Verified by Received Alarm:										

When communications have been verified contact Energy Management Dept at Food Lion to update schedules.

Inputs, Wiring and Indicator Lights

Verified Work Lights Bypass Input:		Verified Outside Lights Override Input:		Verified Operation of all Front Indicator Lights	

All Wiring in the EMS panel is: Neat, Secured and Snap Covers are in place. Mechanical / Electrical

***Please note all discrepancies here:**

HVAC_CHECKLIST_07_25_2007.xls

EMS CHECKOUT

VERIFY INPUTS, OUTPUTS, STAGING AND SETPOINTS

MAIN AHU		AHU-2		AHU-3		O/A UNIT	GROC HT #1	GROC HT #2
SETPOINTS CORRECT?		SETPOINTS CORRECT?		SETPOINTS CORRECT?		O/A FAN	OUTPUTS (AMPS)	
OUTPUTS		OUTPUTS		OUTPUTS	INPUTS		HEAT #1	HEAT #1
AUX HEAT (AMPS)	COOL	AUX HEAT (AMPS)	COOL	AUX HEAT (AMPS)	TEMP SENSORS	COOL #1		
AUX HT#1	COOL #1	AUX HT#1	COOL #1	AUX HT#1	SPACE		HEAT #2	HEAT #2
AUX HT#2	COOL #2	AUX HT#2	COOL #2	AUX HT#2		COOL #2		
AUX HT#3	INPUTS	AUX HT#3	INPUTS	AUX HT#3	OUTLET		SPACE SENSOR	
AUX HT#4	TEMP SENSORS	AUX HT#4	TEMP SENSORS	AUX HT#4	AMBIENT			
AUX HT#5	SPACE	AUX HT#5	SPACE	COOL#1	INLET	DIS TEMP	LIST AMP DRAW FOR ALL ELECT AUX HEAT.	
AUX HT#6	INLET	AUX HT#6	INLET	COOL#2				
	OUTLET		OUTLET					

DELI RTU		RTU-1		RTU-2		FRONT HT	DOCK HT	
SETPOINTS CORRECT?		SETPOINTS CORRECT?		SETPOINTS CORRECT?		HEAT #1	HEAT #1	HEAT #1
OUTPUTS		OUTPUTS		OUTPUTS	INPUTS			
AUX HEAT (AMPS)	COOL	AUX HEAT (AMPS)	COOL	AUX HEAT (AMPS)	TEMP SENSORS	HEAT #2	HEAT #2	HEAT #2
AUX HT#1	COOL #1	AUX HT#1	COOL #1	AUX HT#1	SPACE			
AUX HT#2	COOL #2	AUX HT#2	COOL #2	AUX HT#2			SPACE SENSOR	
AUX HT#3	INPUTS	AUX HT#3	INPUTS	AUX HT#3	OUTLET			
AUX HT#4	TEMP SENSORS	AUX HT#4	TEMP SENSORS	AUX HT#4				
AUX HT#5	SPACE	AUX HT#5	SPACE	COOL#1	INLET	*The 1st stage is the smallest compressor and the second stage is the larger. Verify this in all stores.		
AUX HT#6	INLET	AUX HT#6	INLET	COOL#2				
	OUTLET		OUTLET					

Calibrated O/A Humidity Sensor		Calibrated Main AHU Humidity Sensor		Calibrated Main AHU Temperature Sensor	

Heat Reclaim

Which Racks supply the H/R to which AHU?	AHU RACK(S)	Main AHU	AHU-2	AHU-3	AHU-

Heat Reclaim wiring is run from EMS panel to Correct racks, the wires are landed and the H/R valve and shift are responding to (SEC DEC) (BX RX is Global):

Stage 1 H/R Valve:	A:		B:	C:	D:	
Stage 2 H/R Shift:	A:		B:	C:	D:	

***Please note all discrepancies here:**

HVAC_CHECKLIST_07_25_2007.xls

EMS CHECKOUT

Sweat Miser

Calibrate Sweat Miser:	Temp		Humidity		Verify the dial position settings on the Sweat Miser Control Board		
Verify All Anti-Sweat Heater Circuits have been broken through the Sweat Miser and No Relays have been bypassed:							

ANTI SWEAT	**RELAY 1**		**RELAY 2**		**RELAY 3**		**RELAY 4**		**NOTES:**
	CH-1	**CH-2**	**CH-3**	**CH-4**	**CH-5**	**CH-6**	**CH-7**	**CH-8**	
AMP DRAW									
PULSING Y/N									
REF CIRCUIT #									
BREAKER #									
ANTI SWEAT	**RELAY 5**		**RELAY 6**		**RELAY 7**		**RELAY 8**		Dial Positions: PR 2 and 9 DP 2 and 6
	CH-9	**CH-10**	**CH-11**	**CH-12**	**CH-13**	**CH-14**	**CH-15**	**CH-16**	
AMP DRAW									
PULSING Y/N									
REF CIRCUIT #									
BREAKER #									

PRODUCE PREP ROOM SOLENOID AND DAMPER

Refrigeration solenoid:	Wired		Manual Stem Out		Responds to EMS Control		Verified Sensor Location	
Damper operation:	Wired		Linkage Connected		Responds to EMS Control		Setpoints Verified (CI/CO)	

Water Heaters. *Answer this section Yes / No or OK.*

Verify electric and reclaim water heater operation and setpoints on all water heaters including bathroom. **Reclaim W/H must be under Sensor Control.**

Reclaim set @ 145 CI & 150 CO. **Electric Water Heaters Except Bathroom @ 140deg. (Or Medium or B)** **Bathroom @ 120deg. (Or Low or A)**

Reclaim W/H #1	Reclaim	Elect	**Reclaim W/H #2**	Reclaim	Elect	**Deli W/H**		**Bathroom**	**Bathroom**
						Setpoints:		Setpoints:	Setpoints:
Piped per plan/spec?			**Piped per plan/spec?**			W/H Fed from Reclaim W/H?			
Elements Off with W/H Load?			**Elements Off with W/H Load?**			Elements off with W/H Load?			

***Please note all discrepancies here:**

EMS CHECKOUT

*Please note all discrepancies here:

SECTION 23 09 00 – INSTRUMENTATION & CONTROLS FOR HVAC – (NATIONAL ACCOUNT)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract and Division 00 and 01 Specification Sections, apply to this Section.

B. Refer to Division 26 Electrical.

C. Refer to Section 23 08 00 Commissioning of HVAC.

1.2 SUMMARY

A. Section Includes:

1. HVAC Energy Management System.
2. Mechanical Contractor responsibilities regarding control device installation and wiring.
3. The HVAC equipment and controls are provided to Food Lion as part of a National Account Agreement. Food Lion shall purchase the equipment from SESCO dba MCNAMARA & Co. Contact SESCO at P.O. Box 667, Kernersville, NC 27285, phone (336) 996-2220 for bill of material, scope and services provided by SESCO.

1.3 DEFINITIONS

A. Contractor: Mechanical Contractor.

B. Control wire: Wire carrying 24V or above for the purpose of energizing an HVAC or control device.

C. Cx: Commissioning.

D. CxA: Commissioning Agent/Authority.

E. E.C.: Electrical Contractor.

F. EMS/ECP: Energy Management System/ Environmental Control Panel.

G. Signal wire: Wire carrying low voltage electronic communication signal.

1.4 PERFORMANCE REQUIREMENTS

A. The work required includes all labor, materials, equipment, appurtenances, services and supervision required to provide a complete heating, ventilating and air-conditioning system as shown on the drawings and specified in this Division and associated Divisions.

1. Contractor's Qualifications: Food Lion assumes and requires that the Contractor has had sufficient general knowledge and experience with HVAC controls and wiring. The Contractor shall furnish everything needed or required to complete the HVAC control installation in accordance with reasonable interpretation of the intent of the drawings, specifications and any minor items required by code, law or regulations whether or not specified or specifically shown. This is not intended to cover any major items of equipment or labor not shown or specified and intended, but is intended and will be interpreted to cover the Contractor's full responsibility for providing all miscellaneous labor, parts, devices, accessories and appurtenances which are required or applicable and considered required in keeping with good practice for first-class workmanship, and a system which is complete and operable in every respect.
2. Workmanship: Skilled and experienced workmen in accordance with the best-accepted practices of the industry shall make the entire installation. Where codes are not specific as to workmanship, Food Lion shall reserve the right in determining if the workmanship is substandard. If any workman is found to be failing in the correct performance of his work, he shall be removed from the job immediately.

B. Control Drawings

1. Drawings show arrangement of the system desired and shall be followed as closely as practical. The drawings are universal for Food Lion and their brands. Only equipment and devices shown on the equipment schedule sheet and within the EMS/ECP panel shall apply for this specific project. These drawings shall be used for bidding purposes only.
2. For installation purposes, refer to the control drawings located in the EMS/ECP panel on the project site. Due to changes in standards, methods, and corporate directives, the mechanical control drawings from the construction documents may be superseded..

1.5 ACTION SUBMITTALS

A. Product Data: SESCO will provide control device submittals to the Contractor.

1.6 QUALITY ASSURANCE

A. Warranty
1. Refer to Section 23 00 10 1.6.A.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Refer to 23 09 00 1.2.A.3.

B. Control wire shall be stranded #16 AWG. No plenum rated or MC cable allowed.

C. Signal wire shall be stranded #20 AWG, shielded. No plenum rated or MC cable allowed.

D. Electrical conduit shall be provided and installed by the E.C. The E.C. shall provide a wire pull-string for ease of control wire installation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting the installation of the HVAC controls, conduit and wiring.

3.2 INSTALLATION

A. The Contractor shall refer to the control drawings in the EMS/ECP panel for point-to-point termination and project specific control devices.

B. The Contractor shall refer to the condensing unit wiring diagram regarding the field wiring requirements for the liquid line solenoids.

C. Control wire and Signal wire shall be run in separate conduits.

D. SESCO shall ship the light-level sensor and magnetic switch(es) to the Contractor. The Contractor shall turn over these devices to the E.C. and obtain a written record showing the transfer of possession. Failure to obtain this record of transfer shall mean the Contractor is responsible for these devices in the event of loss or damage.

E. Refer to the mechanical plans for device mounting location and/or height. Coordinate mounting requirements with the E.C. Where the Contractor is uncertain, contact SESCO for clarification; (336) 996-2220 or sescocx@trs-sesco.com.

F. Terminations
1. Contractor shall make final wire terminations at the control devices and within the ECP/EMS panel.
2. Wiring shall be routed in a neat and workmanlike manner. Route wiring in Panduit provided with the panel.

G. The Contractor shall coordinate with the E.C. to place the breakers in Panel E in the “ON” position.

1. The ECP/EMS panel is pre-programmed at the factory. Once the wires are terminated and power is energized, the panel is ready to take control of the equipment.

END OF SECTION 23 09 00

SECTION 23 23 00 – HVAC REFRIGERANT PIPING – (NATIONAL ACCOUNT)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes refrigerant piping with the following components and accessories:

1. HVAC Refrigerant pipe.

1.3 DEFINITIONS

A. AC: Air-Conditioning.

B. Contractor: Mechanical Contractor.

C. CxA: Commissioning Agent.

D. Refrigeration Accessories (for split-systems only): Thermal Expansion Valve, sight glass, filter-driers, pressure ports and liquid-line solenoid(s).

E. DX Refrigerant Coil: Refrigerant coil in the supply-air stream to provide cooling.

1.4 PERFORMANCE REQUIREMENTS

1. The Contractor shall furnish and install refrigerant piping systems as shown and indicated on the drawings. The furnished to the Contractor by the air conditioning equipment supplier for installation

2. The refrigerant accessories shall be selected, provide by, and delivered to the Contractor by SESCO under the Food Lion National Account agreement. Units shall ship with factory and field installed options, as scheduled.

1.5 ACTION SUBMITTALS

A. Product Data: Data included in the submittal shall include rated capacities, operating characteristics, furnished accessories. Also included will be dimensions and weights, required clearances, method of field assembly, components, and location and size of each field connection.

1.6 WARRANTY

A. Refer to section 23 00 10.1.6.A.

PART 2 - PRODUCTS

2.1 SESCO shall provide the refrigeration accessories for each AC refrigeration system circuit.

2.2 Piping shall be hard temper Type L seamless copper tube manufactured specifically for refrigeration systems, factory cleaned, dehydrated and sealed. Refer to refrigerant piping schematic on the mechanical drawings for pipe sizes and location of refrigerant accessories.

2.3 Elbows shall be long-radius, solder joint type manufactured for refrigeration system use and thoroughly cleaned. No 45° elbows will be allowed! All refrigeration piping shall be absolutely clean and free from dirt, dust, lint and scale.

2.4 Pipe size transitions shall be reducing couplings and bushings only. No swage joints allowed.

2.5 Only factory pre-formed P-traps shall be used for suction gas risers.

2.6 All vertical risers in excess of 5 feet shall be trapped. All vertical risers in excess of 20 feet shall be trapped and reduced.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for pipe routing and other conditions affecting performance of the AC refrigeration system.

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

3.2 INSTALLATION AND FIELD QUALITY CONTROL

A. Elbows and fittings shall be kept to a minimum by installing the lines in the most practical direct route, well in advance of the work of other trades. The lines shall be sized as shown on the drawings and installed as recommended by the equipment supplier. Pitch horizontal lines at least 1/2" in 10' in the direction of flow.

B. Refrigerant lines shall be supported from building construction by hanger rods. All suction piping shall have 1/2" thick Armaflex insulation. Splitting of insulation will not be allowed. Glue all butted joints. All closed cell (Armaflex type) insulation exposed to UV light shall be installed with manufacturer's recommended all-weather UV-resistant covering.

1. All piping shall be secured with Hydro-Sorb clamps and Unistrut.

C. Tubing shall be cut square, reamed and sized inside and out. Tubing and fittings shall be thoroughly burnished with fine emery cloth or fitting brushes. Joints shall be made with silver solder or "15% Sil-Fos." Inert dry nitrogen gas shall be continually passed through the copper piping while sweating joints.

D. The Food Lion /SESCO representative reserves the right to cut 2 fittings to ensure nitrogen is used. If oxidation is found, 2 more fittings will be cut. If six (6) cut fittings do not pass the inspection, the Contractor shall completely re-pipe the system. The piping system shall be installed in accordance with ASA B9.1 Safety Code for Mechanical Refrigeration and local codes where applicable.

E. After completion of the piping system, apply pressure test using dry nitrogen with a pre-charge of two and one-half pounds R-410a per 10-tons, or fraction thereof, in the system. All connections shall be brushed with a soap solution and no bubbles shall show. Upon successful completion of the above test, the entire system shall be checked with an electric leak detector. If, in 24 hours, there is no change in the gauge readings allowing for 0.3 psi per degree change in ambient temperature, the system shall be considered tight and ready for evacuation.

1. Food Lion reserves the right to witness pressure testing.

F. The system shall be evacuated using a high vacuum pump capable of producing at least 500 microns mercury absolute as measured by a micron meter. A vacuum of 500 microns shall be held for a minimum of three (3) hours. The system shall be considered acceptable for charging, insulation and subsequent work if no rise in pressure has been observed during the three hours. After such acceptance, a holding charge of R-410a shall be placed in the system until final testing and charging.

1. A SESCO CxA must witness vacuum testing. Scheduling is the responsibility of the Contractor.

G. The system shall not be run until the equipment Pre-Start check list has been completed, moving components have been lubricated and in accordance with instructions, and all electrical and temperature control wiring and installation has been completed and checked. Charge the system.

H. Liquid line driers for the A/C condensing units shall be provided and changed by the Contractor prior to Grand Opening. Suction filters shall be removed at this time and **NOT** reinstalled. Springs shall remain at site, tie wrapped to the unit, out of the weather. The filters removed shall be left in box marked "A/C Condensing Unit Filters". Box shall be left in machine room for inspection and disposal by SESCO.

END OF SECTION 23 23 00

SECTION 23 31 13 - METAL DUCTS AND DUCT ACCESSORIES – (NATIONAL ACCOUNT)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Single-wall rectangular ducts and fittings.
2. Sheet metal materials.
3. Balancing dampers.
4. Flexible duct.
5. Flexible connections.
6. Fire Dampers.

B. Related Sections:

1. Section 23 08 93 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing requirements for metal ducts.

1.3 PERFORMANCE REQUIREMENTS

A. Provide complete systems of supply, return, outside air and exhaust ducts as shown on the drawings.

B. The size and location of the ductwork shall be subject to such variations as may be necessary to suit the field conditions. Where sizes must be varied from those indicated on the drawings, prior approval of the Architect must be obtained.

C. Delegated Duct Design: Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and performance requirements and design criteria indicated in "Duct Schedule" Article.

D. Structural Performance: Duct hangers and supports shall be in accordance with SMACNA’s “HVAC Duct Construction Standards – Metal and Flexible. Refer to the mechanical plans for specific duct hanging methods.

E. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

PART 2 - PRODUCTS

2.1 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

A. General Fabrication Requirements: For all ducts 12 in. or larger, shall be flanged with gasket seal. Sheet metal ductwork shall be of “lock forming quality” G90 galv. Steel, complying with ASTM A527 and ASTM525.

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.

C. Transverse Joints: For ducts 12 in. or larger, seal material shall be DuctMate gasket type Model 440 or equal. Gasket tape to be supplied by the same company that supplies the joint.

D. Longitudinal Seams: All longitudinal seams shall be Pittsburgh Lock.

2.2 SHEET METAL MATERIALS

A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials and thicknesses unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.

1. Galvanized Coating Designation: G90.
2. Finishes for Surfaces Exposed to View: Mill phosphatized, paint grip finish.

C. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

D. Duct-mounted volume dampers and motorized dampers shall be provided by SESCO to Contractor. Duct-mounted grilles shall have a balancing damper provided and installed by the Contractor. Refer to mechanical drawings for installation detail.

1. In Coastal Environments, outside air dampers shall have 16 ga. stainless steel frame and blades, stainless steel linkage with brass pivots, stainless steel bearings and control shaft.

2.3 FLEXIBLE DUCTS AND CONNECTORS

A. Flexible run-outs shall be listed as Class 1 air duct in accordance with UL 181. Flexible duct shall have been tested for the pressures to be encountered in the system in accordance with Air Diffusion Council Criteria. Flexible run-outs shall be factory insulated with a minimum 1-1/2" of 3/4 pcf density glass fiber insulation with foil backed vapor barrier. Flexible run-outs shall have a steel spring helix with a liner that completely shields the insulation from the air stream, equal to Flexmaster Type 9 flex duct.

B. Flexible connections shall be UL classified non-combustible neoprene coated glass fabric for general use and Hypalon coated glass fabric where exposed to sun and/or weather.

2.4 FIRE DAMPERS

A. Fire dampers shall be folding-blade steel curtain type, equal to air balance model 119ML, UL listed for 1-1/2 hour fire resistance rating. They shall be complete with 165F fusible link.

PART 3 - EXECUTION

3.1 DUCT INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.

B. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.

C. Install ducts with fewest possible joints.

D. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.

E. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines. Refer to mechanical drawings for notifications regarding duct routing and height above finish floor.

F. Ductwork shall be fabricated in maximum lengths of 8 feet and shall conform to the sizes and routing shown, except that routing shall be changed and offsets provided by the Contractor to avoid conflicts and/or obstructions encountered.

G. All ductwork shall be true to the dimensions indicated on the drawings and shall be straight and smooth on the inside. All 90 degree elbows shall be provided with double thickness turning vanes. Vanes shall not exceed 36 inches in length and shall be spaced a maximum of four inches apart. Vanes shall be equal to the gauge of the ducts in which installed; all vanes shall be free of rattles. All ductwork shall be constructed to a 1" pressure class. All ductwork shown on drawings are metal to metal dimensions.

H. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness, as applicable.

I. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.

J. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.

K. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers.

L. Protect duct interiors from moisture, construction debris and dust, and other foreign materials. Comply with SMACNA's "IAQ Guidelines for Occupied Buildings Under Construction," Appendix G, "Duct Cleanliness for New Construction Guidelines."

M. Joints: For transverse joints 12" wide and larger, proprietary duct connectors shall be Duct Mate or Ward and installed in complete accordance with manufacturers recommendations, duct sealant to be Duct Mate 440 gasket type or equal. Independent test data must be available certifying that product application will meet SMACNA functional criteria. TDC or TDF connectors may be used but shall be constructed as the non-proprietary SMACNA T-24 flange. For transverse joints 11" wide or smaller, the above may be used, or refer to SMACNA to determine proper duct construction for the specified pressure class. All longitudinal seams shall be Pittsburgh lock.

N. Hangers: All ductwork with a width dimension of 46" or larger shall be supported by trapeze type supports. Supports shall not exceed 8 foot spacing and shall be sized and constructed according to SMACNA. Hangers for ductwork less than 46” in width shall be 1" x 16 gauge galvanized steel straps with a spacing not to exceed 8 feet. All elbows and tees shall be supported with hangers. All duct supports shall be attached to ductwork prior to application of external insulation. External insulation shall cover ductwork and supports at time of application. All HVAC equipment supports and ductwork supports and hangers shall be free of rust and factory primed to receive finish dry fog application.

O. Dampers: Balancing dampers in rectangular ductwork shall be 20 gauge minimum opposed blade type with a maximum air pressure drop of 0.1" water gauge at 1,500 fpm in the fully opened position. Balancing dampers in run-outs shall be 24 gauge butterfly type with insulation standoff bracket and locking quadrant. Fire dampers, smoke dampers or radiation dampers, when required, will be installed in strict accordance with the manufacturer’s installation instructions.

P. Run-outs: All takeoffs from branch ductwork shall be 45 degree metal takeoffs having a rectangular to round transition equal to Flexmaster type STOD, no spin-in fittings will be allowed. Run-outs from STOD 45 degree takeoff to flexible duct shall be round galvanized steel with longitudinal seams. The gauge will vary with the sizes shown and shall be in accordance with SMACNA. Flexible duct shall be attached to metal ductwork with either stainless steel or nylon self-locking clamps. Flexible duct shall be limited to 4 feet in length. Flexible duct shall not be used to make a change in direction and shall be free of kings or deformation. All connections to grills and diffusers shall be rigid connected unless specifically indicated otherwise on the drawings.

Q. Insulation: All concealed ductwork ***and all backroom ductwork*** shall be externally wrapped with 2" thick, 3/4 pcf fibrous glass flexible duct insulation having a flame resistant foil, glass fiber scrim, and fire retardant kraft vapor barrier, commercial quality.

All joints shall be overlapped at least 2" and stapled in place. The stapled seams shall be sealed with a minimum 3" wide pressure sensitive tape designed for use with the duct insulation. All breaks in the vapor barrier facing shall also be sealed with the tape. The underside of the ductwork 24" or greater in width shall have the insulation additionally secured with mechanical fasteners and speed clips spaced approximately 18" on center. The protruding ends of the fasteners shall be cut off flush after the speed clips are installed, and then sealed with the same tape as specified above. In lieu of the above method of sealing, all joints, breaks or punctures in the vapor barrier retarder facing may be sealed with two coats of vapor retarder mastic reinforced with one layer of 4" wide open weave glass fabric. Ductwork in sales area exposed structure shall not be insulated.

R. Duct Isolation: Flexible connections shall be installed where ductwork is connected to air moving units. Minimum free length of any flexible connection shall not be less than 10 inches and care should be taken to see that flexible connection has at least 1 inch slack and is not stretched tight upon installation. A flat braided ground strap shall be provided across connection.

3.2 INSTALLATION OF EXPOSED DUCTWORK

A. Protect ducts exposed in finished spaces from being dented, scratched, or damaged.

B. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system.

C. Grind welds to provide smooth surface free of burrs, sharp edges, and weld splatter. When welding stainless steel with a No. 3 or 4 finish, grind the welds flush, polish the exposed welds, and treat the welds to remove discoloration caused by welding.

D. Maintain consistency, symmetry, and uniformity in the arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.

E. Repair or replace damaged sections and finished work that does not comply with these requirements.

3.3 DUCT SEALING

A. All longitudinal joints and "non-gasketed" transverse joints shall be externally sealed with high pressure duct sealer equal to United McGill or Hard Cast duct sealer. Sealer shall be applied and approved by Food Lion representative before duct insulation is installed.

B. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

3.4 CONNECTIONS

A. Make connections to non-internally isolated equipment with flexible connectors.

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections. Refer to mechanical drawings for details.

3.5 PAINTING

A. Paint interior of metal ducts that are visible through registers and grilles and that do not have duct liner. Apply one coat of flat, black, latex paint over a compatible galvanized-steel primer. Paint materials and application requirements are specified in Section 09 91 13 "Painting".

B. Exposed ductwork on the sales floor shall have paint grip finish and shall be prepared for painting by the Contractor. Preparation shall include cleaning, removing grease or shop fabrication stencils or stickers and any other effort necessary to allow the application and bonding of the paint. Painting shall be the responsibility of the G.C.

3.6 START UP

A. Air Balance: Comply with requirements in Section 23 08 93 "Testing, Adjusting, and Balancing for HVAC."

3.7 DUCT SCHEDULE

A. Supply Ducts:

1. Ducts Connected to Constant-Volume Air-Handling Units:

    a. Pressure Class: Positive 2-inch wg.
    b. Minimum SMACNA Seal Class: A.
    c. SMACNA Leakage Class for Rectangular: 6.

B. Return Ducts:

1. Ducts Connected to Constant-Volume Air-Handling Units:

    a. Pressure Class: Negative 2-inch wg.
    b. Minimum SMACNA Seal Class: A.
    c. SMACNA Leakage Class for Rectangular: 6.

C. Exhaust Ducts (non-grease application):

1. Ducts Connected to Fans Exhausting (ASHRAE 62.1, Class 1 and 2) Air:

    a. Pressure Class: Negative 1-inch wg.
    b. Minimum SMACNA Seal Class: A if negative pressure, and A if positive pressure.
    c. SMACNA Leakage Class for Rectangular: 12.

D. Outdoor-Air (Not Filtered, Heated, or Cooled) Ducts:

1. Ducts Connected to Air-Handling Units:

    a. Pressure Class: Positive or negative 2-inch wg.
    b. Minimum SMACNA Seal Class: A.
    c. SMACNA Leakage Class for Rectangular: 6.

E. Intermediate Reinforcement:

1. Galvanized-Steel Ducts: Galvanized steel.
2. PVC-Coated Ducts:

    a. Exposed to Airstream: Match duct material.
    b. Not Exposed to Airstream: Galvanized.

F. Elbow Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."

    a. Velocity 1000 fpm or Lower:

        1) Radius Type RE 1 with minimum 0.5 radius-to-diameter ratio.
        2) Mitered Type RE 4 without vanes.

    b. Velocity 1000 to 1500 fpm:

        1) Radius Type RE 1 with minimum 1.0 radius-to-diameter ratio.
        2) Radius Type RE 3 with minimum 0.5 radius-to-diameter ratio and two vanes.
        3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."

G. Branch Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-6, "Branch Connection."

    a. Rectangular Main to Rectangular Branch: 45 degree entry.

2. Round: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible, "Figure 3-5," 90 degree Tees and Laterals," and Figure 3-6, "Conical Tees." Saddle taps are permitted in existing duct.

    a. Velocity 1500 or lower: Conical tap.

END OF SECTION 23 31 13

SECTION 23 34 00 – HVAC FANS – (NATION ACCOUNT)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract and Division 01 Specification Sections, apply to this Section.

B. Section 23 31 13 Metal Ducts and Duct Accessories.

1.2 SUMMARY

A. This Section includes HVAC fans:

1. Centrifugal fans, roof-, ceiling-, or in-line mounted.
2. Kitchen Ventilation fans.

1.3 PERFORMANCE REQUIREMENTS

1. Install Owner provided RTUs, as shown and scheduled on the mechanical drawings.
2. The fans shall be provided by SESCO under the Food Lion National Account agreement. Units shall ship with factory and field installed options, as scheduled.

1.4 ACTION SUBMITTALS

A. Product Data: SESCO shall provide the equipment submittal for each fan. Data included in the submittal include rated capacities, operating characteristics, furnished accessories. Also included will be equipment dimensions and weights, required clearances, method of field assembly, components, and location and size of each field connection.

1.5 WARRANTY

A. Refer to Section 23 00 10 1.6.A.

PART 2 - PRODUCTS

2.1 Install motor room exhaust and supply fans as scheduled or pre-approved by SESCO. The fan shall be of the type shown on the plans, including motor, curb cap, wind-band and damper lids. Fan shall be furnished with a unit mounted disconnect switch.

2.2 Install roof-mounted, ceiling-mounted or in-line exhaust fan as scheduled and approved by SESCO.

2.3 Install up-blast ventilators as scheduled and approved by SESCO. The units shall be furnished with a safety disconnect switch and direct drive motor, as scheduled, external conduit connection, as approved by UL for commercial kitchen ventilation.

2.4 Install air-curtains as scheduled and approved by SESCO.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of RTUs.

B. Examine roughing-in for fans to verify actual locations of piping and duct connections before equipment installation.

C. Examine roofs for suitable conditions where fans will be installed.

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

3.2 INSTALLATION

A. Roof-Mounted Applications - Roof Curb: Install on roof structure, level and secure. Install fans on curbs with neoprene gasket and coordinate roof penetrations and flashing with roof construction specified in Section 07 72 00 "Roof Accessories." Secure fans to upper curb rail, and secure curb base to roof framing with anchor bolts.

B. Ceiling-Mounted Applications: Refer to Architectural Reflective Ceiling Plan for fan location. Support fan in accordance with the manufacturer’s recommendations. Fans shall not be supported by the ceiling grid. Connect ductwork to fan outlet flanges. Seal connection air-tight.

C. In-Line Applications: Connect ductwork to fan inlet/outlet flanges. Seal connection air-tight. Support fan in accordance with the manufacturer’s recommendations.

D. Equipment shall be installed so as to provide adequate service clearances on all sides of the unit. Adequate service clearance shall be in accordance with the manufacturer’s recommendations and shall be determined by the SESCO CxA.

3.3 CONNECTIONS

A. Duct installation requirements are specified in other HVAC Sections. Drawings indicate the general arrangement of ducts. The following are specific connection requirements:

1. Install ducts to termination at top of roof curb.
2. Remove roof decking only as required for passage of ducts. Do not cut out decking under entire roof curb.
3. Connect exhaust ducts to fans with flexible duct connectors specified in Section 23 31 13 "Metal Duct and Duct Accessories."

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

1. Manufacturer's Field Service: Contractor shall provide a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing. Report results in writing.

B. Tests and Inspections:

1. After installing fans and after electrical circuitry has been energized, test units for compliance with requirements.
2. Inspect for and remove shipping bolts, blocks, and tie-down straps.
3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

    a. Fans with speed controller shall be left in high-speed.

C. Remove and replace malfunctioning units and retest as specified above.

3.5 STARTUP SERVICE

A. Contractor shall provide a factory-authorized service representative to perform startup service.

B. Complete installation and startup checks according to manufacturer's written instructions and do the following:

1. Inspect for visible damage to unit casing.
2. Inspect for visible damage fan.
3. Verify that labels are clearly visible.
4. Verify that clearances have been provided for servicing.
5. Verify that controls are connected and operable.
6. Verify that filters are installed, if applicable.
7. Verify lubrication on fan and motor bearings.
8. Inspect fan-wheel rotation for movement in correct direction without vibration and binding.
9. Adjust fan belts to proper alignment and tension, if applicable.

10. As applicable, inspect and record performance of interlocks and protective devices; verify sequences.
11. Inspect backdraft dampers for proper operation, as applicable.
12. After startup and performance testing and prior to Substantial Completion, replace existing filters with new filters, as applicable.

END OF SECTION 23 34 00

SECTION 23 37 13 - DIFFUSERS, REGISTERS, AND GRILLES – (NATIONAL ACCOUNT)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Rectangular and square ceiling diffusers.
2. Adjustable bar registers and grilles.
3. Fixed face registers and grilles.

1.3 DEFINITIONS

A. AD: Air-Distribution; Diffusers, Registers and Grilles.

B. RCP: Reflected Ceiling Plan; Architectural plans.

1.4 PERFORMANCE REQUIREMENTS

1. Install Owner provided diffusers, registers and grilles, as shown and scheduled on the mechanical drawings.
2. The AD devices shall be provided by SESCO under the Food Lion National Account agreement. Items shall ship with factory and field installed options, as scheduled.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated, include the following:

1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
2. Diffuser, Register, and Grille Schedule: Indicate drawing designation, room location, quantity, model number, size, and accessories furnished.

PART 2 - PRODUCTS

2.1 CEILING DIFFUSERS

A. Rectangular and Square Ceiling Diffusers – see plans for specifications

2.2 REGISTERS AND GRILLES

A. Adjustable Bar Register – see plans for specifications.

B. Adjustable Bar Grille – see plans for specifications

C. Fixed Face Register – see plans for specifications

D. Fixed Face Grille – see plans for specifications

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.

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

3.2 INSTALLATION

A. Install diffusers, registers, and grilles level and plumb.

B. Ceiling-Mounted Outlets and Inlets: Refer to Architectural drawings for the RCP. Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.

C. Install diffusers, registers, and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers (as applicable).

3.3 ADJUSTING

A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 23 37 13

SECTION 23 38 13 – COMMERCIAL KITCHEN HOODS – (NATIONAL ACCOUNT)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes Type I commercial kitchen hoods.

1.3 DEFINITIONS

A. Listed Hood: A hood, factory fabricated, ETL Listed and tested for compliance with UL 710 standards by a testing agency acceptable to authorities having jurisdiction.

B. Type I Hood: A hood designed for grease-laden vapor exhaust applications.

1.4 PERFORMANCE REQUIREMENTS

1. Install Owner provided Kitchen Hoods, as shown and scheduled on the mechanical drawings.
2. The Kitchen Hoods, including the filters and fire suppression system & testing, shall be provided by SESCO under the Food Lion National Account agreement. Units shall ship with factory and field installed options, as scheduled.

1.5 ACTION SUBMITTALS

A. Product Data: For the following:

1. Standard hoods.
2. Filters/baffles.
3. Fire-suppression systems, UL 300 Compliant.
4. Lighting fixtures.

B. Shop Drawings:

1. Show plan view, elevation view, sections, roughing-in dimensions, service requirements, duct connection sizes, and attachments to other work.
2. Show cooking equipment plan and elevation to confirm minimum code-required overhang.
3. Indicate performance, exhaust and makeup air airflow, and pressure loss at actual Project-site elevation.
4. Show control cabinets.

5. Show fire-protection cylinders, piping, actuation devices, and manual control devices.
6. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
7. Wiring Diagrams: Power, signal, and control wiring.
8. Piping Diagrams: Detail fire-suppression piping and components and differentiate between manufacturer-installed and field-installed piping. Include roughing-in requirements for drain connections. Show cooking equipment plan and elevation to illustrate fire-suppression nozzle locations.

1.6 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to AWS D1.1/D 1.1M, "Structural Welding Code - Steel," for hangers and supports; and AWS D9.1/D9.1M, "Sheet Metal Welding Code," for joint and seam welding.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.7 COORDINATION

A. Coordinate equipment layout and installation with adjacent Work, including lighting fixtures, HVAC equipment, plumbing, and fire-suppression system components.

B. Hood suppression system contractor shall obtain permit and approval from the local fire authority prior to system installation. Hood suppression system and suppression system contractor shall be provided by SESCO.

C. Contractor shall notify SESCO a min. of ten (10) business days when the hood installation is ready for the fire suppression installation.

1.8 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. SESCO shall provide one complete set(s) of grease filters/baffles with the hood.

1.9 WARRANTY

A. Refer to Section 23 00 10 1.6.A.

PART 2 - PRODUCTS

2.1 HOOD MATERIALS AND FABRICATION

A. Provide cooking equipment hood(s) of sizes, quantities and air volumes as indicated on plans. Hood(s) shall be of the full-capture type. The hood(s) shall be constructed with 18 gauge, type 430, stainless steel interior liner and with 18 gauge, type 430, #3 polish stainless steel exterior panels. The assembly at joints and seams on the hood(s) shall be liquid tight. The exposed external welds shall be ground down, smoothed and highly polished. Internal construction shall include aluminized structural steel framing members as required to prevent flexing and fatigue of the inner and outer shell. All unexposed interior surfaces shall be constructed of minimum 18 gauge aluminized steel, including, but not limited to: ducts, plenums, framing and brackets. Provide backsplash panels to extend 48” below bottom edge of hood and run entire length of canopy.

1. Finish shall be free from tool and die marks and stretch lines and shall have uniform, directionally textured, polished finish indicated, free of cross scratches. Grain shall run with long dimension of each piece.
2. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
3. The hood(s) shall be fabricated in accordance with N.F.P.A. Bulletin #96 shall bear the National Sanitation Seal of Approval (NSF). Hoods shall be U.L. Classified.
4. The hood shall be provided with hanging brackets on centers of four (4) feet or less. The Contractor shall locate the hood as indicated on drawings. The mounting height of the hood shall not exceed seven (7) feet between the finished floor and the lower edge of hood.

B. Grease Filters/Baffles: The hood(s) shall include a filter housing constructed of the same material as the interior liner complete with (aluminum) U.L. Classified grease filters of sufficient numbers and sizes to insure optimum performance as specified by the filter manufacturer. The filter housing shall terminate into a pitched internal full-length grease trough which shall drain into a removable recessed one-cup capacity grease cup.

C. Light Fixtures: Vapor proof U.L. listed marine incandescent light fixtures shall be installed at approximately 3-foot centers. The lights shall be prewired to a junction box situated at the top of the hood for field connection to power. The wiring shall conform to the requirements of the National Electrical Code.

D. Control Panel: Panel shall be hood-mounted. This panel shall include TWO on/off toggle-type switches for the control of hood lights and fans. There shall be an indicator lamp located next to each fan switch for positive function status identification. The panel installed shall have a stainless steel bezel plate with integral etched switch and lamp function description.

1. Light and fan switches shall be mounted on front panel of hood canopy.

E. Exhaust Duct – Grease: The exhaust ductwork shall be installed as shown on the drawings. The exhaust duct shall be of 16 gauge black steel and welded. The exhaust duct connecting collars shall be of the heat expansion type. All work shall conform to NFPA #96 recommendations.

2.2 GENERAL HOOD FABRICATION REQUIREMENTS

A. Welding: Use welding rod of same composition as metal being welded. Use methods that minimize distortion and develop strength and corrosion resistance of base metal. Make ductile welds free of mechanical imperfections such as gas holes, pits, or cracks.

1. Welded Butt Joints: Full-penetration welds for full-joint length. Make joints flat, continuous, and homogenous with sheet metal without relying on straps under seams, filling in with solder, or spot welding.
2. Grind exposed welded joints flush with adjoining material and polish to match adjoining surfaces.
3. Where fasteners are welded to underside of equipment, finish reverse side of weld smooth and flush.
4. Coat concealed stainless-steel welded joints with metallic-based paint to prevent corrosion.
5. After zinc-coated steel is welded, clean welds and abraded areas and apply SSPC-Paint 20, high-zinc-dust-content, galvanizing repair paint to comply with ASTM A 780/A 780M.

B. For metal butt joints, comply with SMACNA's "Kitchen Ventilation Systems & Food Service Equipment Guidelines."

C. Where stainless steel is joined to a dissimilar metal, use stainless-steel welding material or fastening devices.

D. Form metal with break bends that are not flaky, scaly, or cracked in appearance; where breaks mar uniform surface appearance of material, remove marks by grinding, polishing, and finishing.

E. Sheared Metal Edges: Finish free of burrs, fins, and irregular projections.

F. In food zones, as defined in NSF, fabricate surfaces free from exposed fasteners.

G. Cap exposed fastener threads, including those inside cabinets, with stainless-steel lock washers and stainless-steel cap (acorn) nuts.

H. Fabricate pipe slots on equipment with turned-up edges sized to accommodate service and utility lines and mechanical connections.

I. Fabricate enclosures, including panels, housings, and skirts, to conceal service lines, operating components, and mechanical and electrical devices including those inside cabinets, unless otherwise indicated.

J. Fabricate equipment edges and backsplashes according to SMACNA's "Kitchen Ventilation Systems & Food Service Equipment Guidelines."

K. Fabricate enclosure panels to ceiling and wall as follows:

1. Fabricate panels on all exposed sides with same material as hood, and extend from ceiling to top of hood canopy and from canopy to wall.
2. Wall Offset Spacer: Minimum of 3 inches.

2.3 TYPE I EXHAUST HOOD FABRICATION

A. Weld all joints exposed to grease with continuous welds, and make filters/baffles or grease extractors and makeup air diffusers easily accessible for cleaning.

1. Fabricate hoods according to NSF 2, "Food Equipment."
2. Hoods shall be listed and labeled, according to UL 710, by a testing agency acceptable to authorities having jurisdiction.
3. Hoods shall be designed, fabricated, and installed according to NFPA 96.
4. Include access panels as required for access to fire dampers and fusible links.
5. Duct Collars: Minimum 0.0598-inch- thick steel at least 3 inches long, continuously welded to top of hood and at corners. Fabricate a collar with a 0.5-inch- wide duct flange.

B. Hood Configuration: Exhaust only.

C. Hood Style: Wall-mounted canopy.

D. Hood Controls: Hood-mounting control cabinet, factory wired, and fabricated of stainless steel.

1. Exhaust Fan Interlock: Factory wiring for exhaust fan shall override EMS operation in the event of fire. The E.C. shall field wire exhaust fan contactor to EMS panel.

E. Capacities and Characteristics: See Hood Manufacturer’s Drawings.

2.4 WET-CHEMICAL FIRE-SUPPRESSION SYSTEM

A. Description: Fire suppression system shall be by Ansul or Pyrochem. Pre-Engineered fixed-nozzle type with distribution piping designed for automatic detection and release or manual release of fire-suppression agent by hood operator. Fire-suppression system shall be UL listed and labeled for complying with NFPA 17A, "Wet Chemical Extinguishing Systems," by a qualified testing agency acceptable to authorities having jurisdiction. The system shall be installed in accordance with NFPA Standard #96. The design of the system shall provide protection of the exhaust plenum, ducts and cooking equipment that may be a source of ignition. It shall also include an audible alarm and automatic shut-off of all fuel and heat sources as required by NFPA Standard #96. The system shall also be capable of either manual or automatic operation.

1. SESCO shall secure the services of the fire protection equipment distributor for installation and certification. The certification report shall be sent to Food Lion Construction Dept. upon completion and acceptance of all work.
2. Steel Pipe, NPS 2 and Smaller: ASTM A 53/A 53M, Type S, Grade A, Schedule 40, plain ends.
3. Malleable-Iron Threaded Fittings: ASME B16.3, Classes 150 and 300.
4. Piping, fusible links and release mechanism, tank containing the suppression agent, and controls shall be factory installed. Controls shall be in stainless-steel control cabinet mounted on hood. Furnish manual pull station for wall mounting. Exposed piping shall be covered with chrome-plated aluminum tubing. Exposed fittings shall be chrome plated.

5. Liquid Extinguishing Agent: Noncorrosive, low-pH liquid.
6. Furnish mechanical gas shutoff valve.
7. Furnish mechanical gas shutoff valve with clearly marked open and closed indicator for field installation.
8. Fire-suppression system controls shall be integrated with controls for fans, lights, and fuel supply.
9. Wiring shall have color-coded, numbered terminal blocks and grounding bar. Spare terminals for fire alarm, optional wiring to start fan with fire alarm, red pilot light to indicate fan operation, and control switches shall all be factory wired in control cabinet with relays or starters. Include spare terminals for fire alarm, and wiring to start fan with fire alarm.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Examine roughing-in for piping systems to verify actual locations of piping connections before equipment installation.

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

3.2 INSTALLATION

A. Install hoods and associated services with clearances and access for maintaining, cleaning, and servicing hoods, filters/baffles, grease extractor, and fire-suppression systems according to manufacturer's written instructions and requirements of authorities having jurisdiction.

B. Securely anchor and attach items and accessories to walls, floors, or bases with stainless-steel fasteners, unless otherwise indicated.

C. Install hoods to operate free from vibration.

D. Install trim strips and similar items requiring fasteners in a bed of sealant. Fasten with stainless-steel fasteners at 48 inches o.c. maximum.

E. Install sealant in joints between equipment and abutting surfaces with continuous joint backing, unless otherwise indicated. Provide airtight, watertight, vermin-proof, sanitary joints.

F. Install lamps, with maximum recommended wattage, in equipment with integral lighting.

G. Set initial temperatures, and calibrate sensors.

H. Set field-adjustable switches.

I. Equipment shall be installed so as to provide adequate service clearances on all sides of the unit. Adequate service clearance shall be in accordance with the manufacturer's recommendations and shall be determined by the SESCO CxA.

3.3 CONNECTIONS

A. Install piping with clearance to allow service and maintenance.

B. Connect ducts according to requirements in Section 23 33 00 "Air Duct Accessories." Install flexible connectors on makeup air supply duct. Weld exhaust-duct connections with continuous liquid-tight joint.

C. Install fire-suppression piping for remote-mounted suppression systems according to NFPA 17A, "Wet Chemical Extinguishing Systems."

3.4 FIELD QUALITY CONTROL

A. Testing Agency: SESCO shall provide a qualified testing agency to perform tests and inspections and prepare test reports. Contractor shall coordinate with SESCO when the systems are completely installed, operational and ready for testing. The Contractor shall provide a minimum ten (10) working days notice to SESCO.

B. Tests and Inspections:

1. Test each equipment item for proper operation. Repair or replace equipment that is defective, including units that operate below required capacity or that operate with excessive noise or vibration.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
3. Test gas components for leaks. Repair or replace leaking components.
4. Perform hood performance tests required by authorities having jurisdiction.
5. Perform fire-suppression system performance tests required by authorities having jurisdiction.

C. Prepare test and inspection reports.

END OF SECTION 23 38 13

SECTION 23 54 00 – CENTRAL HEATING EQUIPMENT – (NATIONAL ACCOUNT)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes packaged, outdoor, central-station air-handling units (rooftop units) with the following components and accessories:

1. Electric duct heaters.
2. Electric unit heaters.
3. Natural gas unit heaters.

1.3 DEFINITIONS

A. EMS: Energy Management System.

1.4 PERFORMANCE REQUIREMENTS

1. Install Owner provided heaters, as shown and scheduled on the mechanical drawings.
2. The duct-mounted or unit heaters shall be provided by SESCO under the Food Lion National Account agreement. Units shall ship with factory and field installed options, as scheduled.

1.5 ACTION SUBMITTALS

A. Product Data: SESCO shall provide the equipment submittal for each RTU. Data included in the submittal include rated capacities, operating characteristics, furnished accessories. Also included will be equipment dimensions and weights, required clearances, method of field assembly, components, and location and size of each field connection.

1.6 WARRANTY

A. Refer to Section 23 00 10 1.6.A.

PART 2 - PRODUCTS

2.1 Electric Duct Heater: Install electric duct heater(s) as scheduled and shown on drawings. The heater(s) shall be the insert type, with air flow differential control, magnetic contractors, time delays between circuits, fuse blocks with fuses, control power transformer (if required), and terminal blocks. The insert heater shall be UL labeled and certified for the application shown.

2.2 Electric Unit Heater: Install electric unit heater(s) as scheduled and shown on drawings. The heater(s) shall be the horizontal type, with adjustable air flow deflectors. The heater shall be UL labeled and certified for the application shown. Mounting shall be in accordance with Section 23 05 29.

2.3 Natural Gas Duct Heater: Furnish and install Natural Gas Duct Heaters as scheduled and shown on drawings.

2.4 Natural Gas Unit Heater: Furnish and install Natural Gas Duct Heaters as scheduled and shown on drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of heaters.

B. Examine roughing-in for heaters to verify actual locations of piping and electrical connections before equipment installation.

C. Examine for suitable conditions where heaters will be installed.

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

3.2 INSTALLATION

A. Equipment Mounting:

1. Observe manufacturer’s recommended clearances from combustible items unless their listing permits otherwise.
2. Install heaters in strict accordance with manufacturer’s instructions.
3. Heater shall be firmly supported by threaded rod on each corner, as appropriate.
4. Install heaters such that electrical control panels are accessible in accordance with manufacturer’s recommendations and pertinent code requirements.
5. The ducts connected to the duct furnaces shall have removable access panels on both the upstream and downstream sides of the furnaces.

6. Automatic control for electric or gas furnaces will be provided through the EMS, unless noted otherwise.

B. Equipment shall be installed so as to provide adequate service clearances on all sides of the unit. Adequate service clearance shall be in accordance with the manufacturer's recommendations and shall be determined by the SESCO CxA.

3.3 CONNECTIONS

A. Install piping adjacent to heaters, as applicable, to allow service and maintenance.

B. For duct-mounted applications: Duct installation requirements are specified in other HVAC Sections. The following are specific connection requirements:

1. Install duct to heater flanges and seal air-tight.

C. For unit heater applications: Locate heaters in accordance with manufacturer recommended clearances.

3.4 STARTUP SERVICE

A. Complete installation and startup checks according to manufacturer's written instructions and do the following:

1. Inspect for visible damage to unit casing.
2. Inspect for visible damage to heat exchanger or electrical elements.
3. Verify that labels are clearly visible.
4. Verify that clearances have been provided for servicing.
5. Verify that controls are connected and operable.
6. Inspect and record performance of interlocks and protective devices; verify sequences.
7. Adjust and inspect high-temperature limits.
8. Inspect controls for correct sequencing and normal and emergency shutdown.

END OF SECTION 23 54 00

SECTION 23 55 13 - FUEL-FIRED DUCT HEATERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes gas-fired duct heaters.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of gas-fired duct heater indicated. Include rated capacities, operating characteristics, and accessories.

B. Shop Drawings: For gas-fired duct heaters. Include plans, elevations, sections, details, and attachments to other work.

1. Prepared by or under the supervision of a qualified professional engineer detailing fabrication and assembly of gas-fired duct heaters, as well as procedures and diagrams.
2. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
3. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
4. Wiring Diagrams: Signal and control wiring.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. ASHRAE/IESNA 90.1 Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

1.5 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace heat exchanger of gas-fired duct heater that fails in materials or workmanship within specified warranty period.

1. Warranty Period: One year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Furnish and install natural gas power-vented indoor gas-fired duct furnaces as scheduled and shown on the drawings. The units shall be completely factory assembled and approved for use downstream from cooling coils. Each unit shall be equipped with a stainless steel heat exchanger, 409 stainless steel burner, automatic intermittent-duty pilot spark ignition system, drain pan, 115/24 vac control power transformer, and 120 vac/24v relay for ECP interface. Where two stage control is specified, a two-stage gas valve shall be provided that will furnish 50% of full rated input on first stage and 100% of the full rated input when operating on both stages. All controls shall be rated for a maximum of 1/2 psi gas pressure and be exposed for easy access. All units shall be of the high cfm type and in no case shall be of the air pressure drop exceed the values shown on the drawings. All units shall be AGA certified.

B. Reznor Series 100, Venturion Model FE gas-fired unit heaters are designed for 80% thermal efficiency and were developed to provide an annual fuel use improvement of up to 25% when compared with gravity-vented unit heaters. The use of a factory-installed power venter, with metered combustion air, limits burner flue losses while reducing vent pipe size. A sealed flue product collection chamber, in lieu of a draft diverter, reduces the loss of dilution air from the room in both the on and off cycles. The Model FE unit heaters use either natural or propane gas, as specified, in sizes from 25,000 through 400,000 BTUH gas input. These units are designed for ceiling suspension with propeller fans for air delivery.Standard features on the Model FE series include an intermittent spark pilot and a single-stage, 24-volt thermostat for automatic operation. Each unit is provided with a fan control and all required limit safety controls, including an energy cutoff (ECO) device, and a combustion air pressure switch that verifies proper vent flow before allowing operation of the gas valve.

C. Duct furnaces: Listed gas-fired duct furnaces shall be installed with a minimum clearance of at least 6 inches from any combustible construction unless their listing permits installation with lesser clearances. Duct furnaces shall be firmly supported by threaded rod on each corner and the duct connections shall be permanently caulked, taped or otherwise sealed air-tight at all points to prevent air leakage from disturbing the flame. The furnaces shall be installed in strict accordance with the manufacturer's instructions. The ducts connected to the duct furnaces shall have removable access panels on both the upstream and downstream sides of the furnaces. Automatic control for scheduled furnace will be provided through the ECP (environmental control panel). All other duct furnaces will be controlled through their respective 24v room thermostat.

2.2 INSTALLATION

A. Install and connect gas-fired duct heaters and associated fuel and vent features and systems according to NFPA 54, applicable local codes and regulations, and manufacturer's written installation instructions.

B. Suspended Units: Suspend from substrate using threaded rods, spring hangers, and building attachments. Secure rods to unit hanger attachments. Adjust hangers so unit is level and plumb.

1. Spring hangers and seismic restraints are specified in Section 23 05 29 "Hangers and Supports for HVAC Piping and Equipment."
2. Restrain the unit to resist code-required horizontal acceleration.

C. Piping and Fittings

1. All piping and fittings located outdoors and above grade shall be cleaned and painted with one coat of zinc dust primer and one finish coat of aluminum base paint.
2. Piping installed through foundation wall shall be encased in a sleeve, and the sleeve shall be sealed to prevent entry of water. Gas piping shall not be installed in or on the ground under the building. Sealant between pipe and sleeve shall also electrically insulate the pipe from the structure.
3. Piping and fittings shall be clear and free from cutting burrs and defects in structure or threading and shall be thoroughly brushed and scale blown. Joint compounds shall be applied sparingly and only to the male threads of metallic joints.
4. Piping shall be supported with hangers suitable for the size of piping and of adequate strength and quality, and located at the proper intervals so that the piping cannot be moved from its installed position. Gas piping shall not be supported from other piping. Vertical piping shall be supported every 8'0". Horizontal gas piping shall be supported as follows:

PIPE SIZE (in)	SPACING (ft)
1/2	6
3/4 or 1	8
1-1/4 or larger	10

5. A 12" dirt leg shall be installed for each gas outlet and have the same diameter as the outlet pipe.
6. Shut off valves shall be located within three (3) feet of each piece of gas fired equipment and ahead of the union connecting thereto. No shut off valves shall be installed in a return air plenum. Valves shall be of the type approved for use with natural gas fuel.
7. All gas piping within the building and other above ground piping shall be electrically continuous and bonded to a ground electrode as defined in NFPA 70.

2.3 CONNECTIONS

A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to gas-fired duct heaters to allow service and maintenance.

C. Gas Piping: Connect gas piping to gas train inlet; provide union with enough clearance for burner removal and service.

1. Above grade piping shall be Schedule 40 threaded black steel.
2. Metallic piping installed underground shall be Schedule 40 black steel coated with a 30 mil bitumastic material. Coating shall be machined applied.
3. Fittings shall be black 150 pound malleable iron screwed fittings.
4. Valves (gas cock) shall be cast brass or bronze with machined seats and plug. Valve connections shall be threaded.

D. Vent Connections: All vents and vent connectors shall be double wall type B vents constructed from galvanized steel outer wall and #1100 aluminum inner wall.

E. Duct Connections: Comply with Section 233113 "Metal Ducts."

F. Electrical Connections: Comply with applicable requirements in electrical Sections.

1. Install electrical devices furnished with heaters but not specified to be factory mounted.

2.4 ADJUSTING

A. Adjust initial temperature set points.

B. Adjust burner and other unit components for optimum heating performance and efficiency.

2.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain gas-fired duct heaters.

END OF SECTION 23 55 13

SECTION 23 62 13 – PACKAGED AIR-COOLED REFRIGERANT COMPRESSOR AND CONDENSER UNITS – (NATIONAL ACCOUNT)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract and Division 01 Specification Sections, apply to this Section.

B. Section 23 08 00 COMMISSIONING FOR HVAC

1.2 SUMMARY

A. Section includes packaged, air-cooled refrigerant compressor and condenser units for outdoor installation.

1.3 PERFORMANCE REQUIREMENTS

1. Install Owner provided air-cooled condensing units, as shown and schedule on the mechanical drawings.
2. The air-cooled condensing unit shall be provided by SESCO under the Food Lion National Account agreement. Units shall ship with field installed vibration eliminators.
3. Refrigeration specialties shall be provided by SESCO and includes: Thermal expansion valve, liquid-line solenoid valves, sight glass and gauge ports. Refer to refrigeration piping detail on the Mechanical Detail sheet within the mechanical drawings.

1.4 ACTION SUBMITTALS

A. Product Data: SESCO shall provide the equipment submittal for each air-cooled refrigerant condenser. Data included in the submittal include rated capacities, operating characteristics, furnished specialties, and accessories. Also included will be equipment wiring diagrams, dimensions and weights, required clearances, method of field assembly, components, and location and size of each field connection.

1.5 QUALITY ASSURANCE

A. Air-cooled condensing units shall be UL or ETL listed.

1.6 COORDINATION

A. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Section 07 72 00 "Roof Accessories."

B. Coordinate location of refrigerant piping and electrical rough-ins.

1.7 WARRANTY

A. Refer to Section 23 00 10 1.6.A.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Description: Factory assembled and tested; consisting of casing, compressors, condenser coils, condenser fans and motors, and unit controls.

B. Refrigerant Circuit: R-410a.

1. Two (2) sight glasses.
2. Suction and filter line driers factory mounted. Refer to Section 23 23 00 Refrigerant Piping for change out of refrigerant filter-driers.
3. Piping secured with Hydro-Sorb clamps.

C. Compressors:

1. Scroll type compressors.

D. Condenser Coil: Factory tested at 425 psig.

1. Coils shall be 1/2" O.D. copper tube with max. twelve (12) plate type dye formed aluminum fins per inch.
2. Separate sub-cooling coil integral with the main condenser provided for each refrigerant circuit.
3. Condenser coil shall have electro-fin or AST coating when store is located within 30 miles of the coast.
4. See drawings for unit schedule.

E. Operating and Safety Controls:

1. Motor starters or motor contactor.
2. Condenser fan motors: Size as indicated on drawings, heavy duty with thermal overload protection. Direct drive, 12-pole 540 rpm motors with permanently lubricated ball bearings. Magnetic contactors.
3. 115-V control transformer, if required.
4. Non-fused factory-mounted and -wired disconnect switch for single external electrical power connection.
5. Unit shall be equipped with motor-saver phase loss monitors for compressors.
6. High-pressure control shall be manual reset.

7. Pump down control shall be automatic reset.
8. The refrigerant pressure control shall be dual pressure type connected to the compressor with braided lines.
9. Fan-cycling pressure control to be used with braided hoses.

F. Casings: Designed for outdoor installation with weather protection for components and controls, and with the following:

1. Removable panels for access to controls, condenser fans, motors, and drives.
2. Min. 12-ga. Aluminum reinforced casing with bolted gussets and galv. Steel.
3. Galv. steel fan guards.
4. Lifting eyes.
5. Removable legs.

2.2 CAPACITIES AND CHARACTERISTICS

A. Heat-Rejection Capacity: See drawing for capacities.

B. Condensing Temperature: Per manufacturer.

C. Ambient-Air Temperature: See drawings

D. Refrigerant Pipe Connections: Per manufacturer.

E. Coils: Per manufacturer.

F. Fans: Per manufacturer.

G. Electrical Characteristics: See drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of air-cooled refrigerant condensers.

B. Examine roughing-in for refrigerant piping systems to verify actual locations of piping connections before equipment installation. Coordinate location with the G.C.

C. Examine walls, floors, and roofs for suitable conditions where air-cooled condensers will be installed.

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

3.2 INSTALLATION

A. Refer to section 23 08 00 COMMISSIONING FOR HVAC regarding micron leak test. Test must be performed prior to charging the system with refrigerant.

B. Install unit level and plumb, firmly anchored in locations indicated; maintain manufacturer's recommended clearances.

C. Equipment Mounting:

1. Structural steel shall be provided by the G.C. Coordinate unit location with the G.C.
2. Secure condensing unit to structural steel via welding or bolting.

D. Equipment shall be installed so as to provide adequate service clearances on all sides of the unit. Adequate service clearance shall be in accordance with the manufacturer’s recommendations and shall be determined by the SESCO CxA.

E. Loose Components: Install electrical components, devices, and accessories that are not factory mounted.

3.3 CONNECTIONS

A. Install piping adjacent to machine to allow service and maintenance.

B. Refrigerant Piping: Connect piping to unit with service valves, solenoid valves and moisture indicator on each refrigerant-circuit liquid line.

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections:

1. Perform electrical test and visual mechanical inspection.
2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation. Complete manufacturer's starting checklist.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
5. Verify proper airflow over coils.

B. Verify that vibration isolation and flexible connections properly dampen vibration transmission to structure.

C. Air-cooled refrigerant condensers will be considered defective if they do not pass tests and inspections. Notify the Food Lion Construction Manager and the SESCO CxA upon discovery of any deficiency.

D. Prepare test and inspection reports.

3.5 STARTUP SERVICE

A. The Contractor shall provide a factory-authorized service representative to perform startup service. Notify SESCO CxA min. two (2) weeks prior to equipment start-up. The SESCO CxA shall verify the equipment start-up.

1. Complete installation and startup checks according to manufacturer's written instructions in the Installation/Operation/Maintenance (IOM) manual and perform the following:

    a. Inspect for physical damage to unit casing.
    b. Verify that access doors move freely and are weather tight.
    c. Clean units and inspect for construction debris.
    d. Verify that all bolts and screws are tight.
    e. Adjust vibration isolation and flexible connections.
    f. Verify that controls are connected and operational.

2. Lubricate bearings on fan motors.
3. Verify that fan wheel is rotating in the correct direction and is not vibrating or binding.
4. Start unit according to manufacturer's written instructions in the IOM manual.
5. Measure and record performance parameters, as indicated on the equipment start-up sheet(s). Refer to Section 23 08 00 Commissioning of HVAC.
6. Verify proper operation of capacity control device.
7. Verify that vibration isolation and flexible connections properly dampen vibration transmission to structure.
8. After startup and performance test, lubricate bearings.

END OF SECTION 23 62 13

SECTION 23 73 23 – CUSTOM INDOOR CENTRAL-STATION AIR-HANDLING UNITS – (NATIONAL ACCOUNT)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes custom indoor central-station air-handling units with the following components and accessories:

1. Direct-expansion cooling.
2. Motorized outdoor-air damper.

1.3 DEFINITIONS

A. EMS: Energy Management System.

B. OA = Outdoor Air.

C. RA = Return Air.

D. MA = Mixed Air. The result of the mixing of two or more air-streams, usually OA and RA.

E. SA = Supply Air.

F. OA Refrigerant Coil: Refrigerant coil in the outdoor-air stream to cool and dehumidify the OA.

G. MA Refrigerant Coil: Refrigerant coil in the main sales AHU that cools and dehumidifies a mixture of OA and RA.

H. AHU: Air-Handling Unit. As used in this Section, this abbreviation means custom indoor central-station air-handling units.

I. SA Fan: The fan providing supply air to conditioned space. "Supply air" is defined as the air entering a space from air-conditioning, heating, or ventilating apparatus.

J. CVVT: Constant-air volume and variable temperature.

1.4 PERFORMANCE REQUIREMENTS

1. Install Owner provided AHUs, as shown and scheduled on the mechanical drawings.
2. The AHUs shall be provided by SESCO under the Food Lion National Account agreement. Units shall ship with field installed vibration eliminators.
3. Refrigeration specialties shall be provided by SESCO and includes: Thermal expansion valve, liquid-line solenoid valves, sight glass and gauge ports. Refer to refrigeration piping detail on the Mechanical Detail sheet within the mechanical drawings.

1.5 ACTION SUBMITTALS

A. Product Data: SESCO shall provide the equipment submittal for each AHU. Data included in the submittal include rated capacities, operating characteristics, furnished specialties, and accessories. Also included will be equipment dimensions and weights, required clearances, method of field assembly, components, and location and size of each field connection.

1.6 WARRANTY

A. Refer to Section 23 00 10 1.6.A.

PART 2 - PRODUCTS

2.1 Furnish and install AHUs as scheduled and shown on drawings. The units shall be designed for indoor use.

A. Filter Section: High capacity angular 2” filter section, MERV 7 filters.

B. Custom DX Refrigerant Cooling Coil: DX and bypass ports and dampers to be integral to coil casing and operable by extended shaft through the exterior of the casing and with lockable hand quadrant. Coil section shall have double-sloped IAQ drain pan.

1. O.A. unit DX coil shall have electro-fin or AST coating when store is located within 30 miles of the coast.

C. Custom Heat Reclaim Coil: Design, capacity and configuration shall be determined from the latest refrigeration summary.

D. Coil Sections shall have intermediate stainless steel drain pan.

E. SA Fan: Class II or III (as required) centrifugal fan, belt drive. Premium efficiency motor. Fan shall be internally isolated. Access for maintenance or replacement shall be via both sides of fan section. All fan motors 5 hp and greater shall have the electrical connections made up at the motor using split bolt connectors and not wire nuts.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of ahUs.

B. Examine roughing-in for AHUs to verify actual locations of piping and duct connections before equipment installation.

C. Examine structural members for suitable conditions where AHUs will be installed.

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

3.2 INSTALLATION

A. Equipment Mounting:

1. AHUs shall be supported by threaded rod and angle-steel supports selected to accommodate the operating weight of the equipment.
2. A steel grate service platform shall be fabricated and installed by the G.C. Refer to the Architectural drawings for the platform drawing detail.
3. Equipment shall be installed so as to provide adequate service clearances on all sides of the unit. Adequate service clearance shall be in accordance with the manufacturer’s recommendations and shall be determined by the SESCO CxA.

3.3 CONNECTIONS

A. Install condensate drains, minimum connection size, with traps and indirect connection to nearest floor drain. Refer to drawings.

B. Install refrigerant piping adjacent to AHUs to allow service and maintenance.

C. Duct installation requirements are specified in other HVAC Sections. Drawings indicate the general arrangement of ducts. The following are specific connection requirements:

1. Install ducts to unit outlet (SA) connection and the return plenum field fabricated by the Contractor. Refer to mechanical plans for plenum construction detail.

3.4 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. After installing AHUs and after electrical circuitry has been energized, test units for compliance with requirements.
2. Inspect for and remove shipping bolts, blocks, and tie-down straps.

3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Remove and replace malfunctioning units and retest as specified above.

3.5 STARTUP SERVICE

A. Complete installation and startup checks according to manufacturer's written instructions and do the following:

1. Inspect for visible damage to unit casing.
2. Inspect internal insulation.
3. Verify that labels are clearly visible.
4. Verify that clearances have been provided for servicing.
5. Verify that controls are connected and operable.
6. Verify that filters are installed.
7. Remove packing from vibration isolators.
8. Verify lubrication on fan and motor bearings.
9. Inspect fan-wheel rotation for movement in correct direction without vibration and binding.
10. Adjust fan belts to proper alignment and tension.
11. Start unit according to manufacturer's written instructions.
12. Inspect and record performance of interlocks and protective devices; verify sequences.
13. Operate unit for an initial period as recommended or required by manufacturer.
14. Inspect outdoor-air dampers for proper stroke and interlock with supply fan.
15. Start HVAC refrigeration system in accordance with Section 23 08 00 Commissioning of HVAC section 3.2.C and the appropriate forms at the end of the section.
16. Inspect controls for correct sequencing of heating, OA damper, refrigeration, and normal and emergency shutdown.
17. After startup and performance testing and prior to Substantial Completion, replace existing filters with new filters.

3.6 CLEANING AND ADJUSTING

A. After completing system installation and testing, adjusting, and balancing RTU and air-distribution systems, clean filter housings and install new filters.

END OF SECTION 23 73 23

SECTION 23 74 13 - PACKAGED, OUTDOOR, CENTRAL-STATION AIR-HANDLING UNITS – (NATIONAL ACCOUNT)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract and Division 01 Specification Sections, apply to this Section.

B. Section 23 31 13 Metal Ducts and Duct Accessories.

1.2 SUMMARY

A. This Section includes packaged, outdoor, central-station air-handling units (rooftop units) with the following components and accessories:

1. Direct-expansion cooling.
2. Roof curbs.

1.3 DEFINITIONS

A. EMS: Energy Management System.

B. Condenser Coil: Refrigerant coil used to reject heat during cooling operations.

C. Condenser Fan: The outdoor-air refrigerant-coil fan that promotes outdoor air circulation over the condenser coil.

D. RTU: Rooftop unit. As used in this Section, this abbreviation means packaged outdoor, central-station air-handling units mounted on the roof.

E. Supply-Air Fan: The fan providing supply air to conditioned space. "Supply air" is defined as the air entering a space from air-conditioning, heating, or ventilating apparatus.

F. DX Refrigerant Coil: Refrigerant coil in the supply-air stream to provide cooling.

1.4 PERFORMANCE REQUIREMENTS

1. Install Owner provided RTUs, as shown and scheduled on the mechanical drawings.

2. The RTUs shall be provided by SESCO under the Food Lion National Account agreement. Units shall ship with factory and field installed options, as scheduled.

1.5 ACTION SUBMITTALS

A. Product Data: SESCO shall provide the equipment submittal for each RTU. Data included in the submittal include rated capacities, operating characteristics, furnished accessories. Also included will be equipment dimensions and weights, required clearances, method of field assembly, components, and location and size of each field connection.

1.6 WARRANTY

A. Refer to Section 23 00 10 1.6.A.

PART 2 - PRODUCTS

2.1 Install roof top unit as scheduled and shown on drawings. The unit shall be designed for outdoor use and include unit support curb, refrigeration system, electric or gas heating system, filters, operating and safety controls, and single power point connection. Unit shall be factory assembled, shipped as a single unit, and UL approved. Unit must be capable of EMS interface with Food Lion current controls.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of RTUs.

B. Examine roughing-in for RTUs to verify actual locations of piping and duct connections before equipment installation.

C. Examine roofs for suitable conditions where RTUs will be installed.

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

3.2 INSTALLATION

A. Shall be as per manufacturer’s recommendation and codes.

B. Roof Curb: Install on roof structure, level and secure. Install RTUs on curbs with neoprene gasket and coordinate roof penetrations and flashing with roof construction specified in Section 07 72 00 "Roof Accessories." Secure RTUs to upper curb rail, and secure curb base to roof framing or concrete base with anchor bolts.

C. Equipment shall be installed so as to provide adequate service clearances on all sides of the unit. Adequate service clearance shall in accordance with the manufacturer's recommendations and shall be determined by the SESCO CxA.

3.3 CONNECTIONS

A. Install condensate drain, minimum connection size, with trap and indirect connection to nearest roof drain or area drain.

B. Install piping adjacent to RTUs to allow service and maintenance.

C. Duct installation requirements are specified in other HVAC Sections. Drawings indicate the general arrangement of ducts. The following are specific connection requirements:

1. Install ducts to termination at top of roof curb.
2. Remove roof decking only as required for passage of ducts. Do not cut out decking under entire roof curb.
3. Connect supply ducts to RTUs with flexible duct connectors specified in Section 233113 "Metal Ducts and Duct Accessories."
4. Install return-air duct continuously through roof structure.

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

B. Tests and Inspections:

1. After installing RTUs and after electrical circuitry has been energized, test units for compliance with requirements.
2. Inspect for and remove shipping bolts, blocks, and tie-down straps.
3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Remove and replace malfunctioning units and retest as specified above.

3.5 STARTUP SERVICE

A. Contractor shall provide a service representative to perform startup service.

B. Complete installation and startup checks according to manufacturer's written instructions and do the following:

1. Inspect for visible damage to unit casing.
2. Inspect for visible damage to compressor, coils, and fans.
3. Inspect internal insulation.
4. Verify that labels are clearly visible.

5. Verify that clearances have been provided for servicing.
6. Verify that controls are connected and operable.
7. Verify that filters are installed.
8. Clean condenser coil and inspect for construction debris.
9. Remove packing from vibration isolators.
10. Verify lubrication on fan and motor bearings.
11. Inspect fan-wheel rotation for movement in correct direction without vibration and binding.
12. Adjust fan belts to proper alignment and tension.
13. Start unit according to manufacturer's written instructions.

    a. Start HVAC refrigeration system.
    b. Do not operate below recommended low-ambient temperature.
    c. Complete startup sheets and attach copy with Contractor's startup report.

14. Inspect and record performance of interlocks and protective devices; verify sequences.
15. Operate unit for an initial period as recommended or required by manufacturer.
16. Adjust and inspect high-temperature limits.
17. Inspect outdoor-air dampers for proper stroke and interlock with return-air dampers.
18. Start HVAC refrigeration system and measure and record the following when ambient is a minimum of 15 deg F above return-air temperature:
19. Inspect controls for correct sequencing of heating, outside air dampers, refrigeration, and normal and emergency shutdown.
20. Simulate maximum cooling demand and inspect the following:

    a. Compressor refrigerant suction and hot-gas pressures.
    b. Short circuiting of air through condenser coil or from condenser fans to outdoor-air intake.

21. After startup and performance testing and prior to Substantial Completion, replace existing filters with new filters.

3.6 CLEANING AND ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions.

B. After completing system installation and testing, adjusting, and balancing RTU and air-distribution systems, clean filter housings and install new filters.

END OF SECTION 23 74 13

SECTION 26 05 19 – LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Building wires and cables rated 600 V and less.
   2. Connectors, splices, and terminations rated 600 V and less.

1.2 SUBMITTALS

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

B. Field quality-control test reports.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

A. Copper Conductors: Comply with NEMA WC 70.

B. Conductor Insulation: Types THW, THHN-THWN, XHHW, UF, USE, and SO.

C. Multi-conductor Cable: Comply with NEMA WC 70 for armored cable, Type AC metal- clad cable, Type MC mineral-insulated, metal-sheathed cable, Type MI nonmetallic- sheathed cable, Type NM Type SO and Type USE with ground wire.

2.2 CONNECTORS AND SPLICES

A. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

2.3 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders, Copper: Install stranded conductors unless otherwise indicated.

B. Branch Circuits, Copper: Install stranded conductors unless otherwise indicated.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Service Entrance: Type THHN-THWN, single conductors in raceway Type XHHW, single conductors in raceway. Type SE or USE multi-conductor cable

B. Exposed Feeders: Type THHN-THWN, single conductors in raceway.

C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspaces: Type THHN- THWN, single conductors in raceway. For fished installations only, Armored cable, Type AC Metal-clad cable, Type MC

D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway Underground feeder cable, Type UF.

E. Exposed Branch Circuits, Including in Crawlspaces: Type THHN-THWN, single conductors in raceway. Armored cable: Type AC, Metal-clad cable: Type MC, where indicated or with approval by AHJ.

F. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway. Only when approved in writing by the AHJ: Armored cable, Type AC or Metal-clad cable, Type MC.

G. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway. Underground branch-circuit cable: Type UF.

H. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.

I. Class 1 Control Circuits: Type THHN-THWN, in raceway.

J. Class 2 Control Circuits: Type THHN-THWN, in raceway Power-limited cable, concealed in building finishes. Power-limited tray cable, in cable tray.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. Complete raceway installation between conductor and cable termination points according to Section 26 05 33 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.

B. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.

C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

F. Support cables according to Section 26 05 29" Hangers and Supports for Electrical Systems."

3.4 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

1. Use oxide inhibitor in each splice and tap conductor for aluminum conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

3.5 IDENTIFICATION

A. Identify and color-code conductors and cables according to Section 26 05 53 "Identification for Electrical Systems."

B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.6 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 26 05 44 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.7 FIRE STOPPING

A. Apply fire stopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Section 07 84 13 "Penetration Fire stopping."

B. Field Quality Control

C. Tests and Inspections:
1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors, and conductors feeding the following critical equipment and services for compliance with requirements.
   a. Insert, in separate subparagraphs, critical equipment and services to be tested.
2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
3. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each splice in cables and conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner.
   a. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each splice 11 months after date of Substantial Completion.
   b. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
   c. Record of Infrared Scanning: Prepare a certified report that identifies splices checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

D. Test Reports: Prepare a written report to record the following:
1. Test procedures used.
2. Test results that comply with requirements.
3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

E. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION 26 05 19

SECTION 26 05 26 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes grounding and bonding systems and equipment.

1.3 QUALITY ASSURANCE

A. Testing Agency Qualifications: Member company of NETA or an NRTL.

1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

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.

B. Comply with UL 467 for grounding and bonding materials and equipment.

2.2 CONDUCTORS

A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

B. Bare Copper Conductors:

1. Solid Conductors: ASTM B 3.

2. Stranded Conductors: ASTM B 8.

C. Grounding Bus: Predrilled rectangular bars of annealed copper, 1/4 by 4 inches in cross section, with 9/32-inch holes spaced 1-1/8 inches apart. Stand-off insulators for mounting shall comply with UL 891 for use in switchboards, 600 V and shall be Lexan or PVC, impulse tested at 5000 V.

2.3 CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy.

C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

2.4 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel; 3/4 inch by 10 feet.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.

B. Underground Grounding Conductors: Install bare copper conductor, No. 2/0 AWG minimum.

1. Bury at least 24 inches below grade.
2. Duct-Bank Grounding Conductor: Bury 12 inches above duct bank when indicated as part of duct-bank installation.

C. Isolated Grounding Conductors: Green-colored insulation with continuous yellow stripe. On feeders with isolated ground, identify grounding conductor where visible to normal inspection, with alternating bands of green and yellow tape, with at least three bands of green and two bands of yellow.

D. Grounding Bus: Install in electrical equipment rooms, in rooms housing service equipment, and elsewhere as indicated.

1. Install bus horizontally, on insulated spacers 2 inches minimum from wall, 6 inches above finished floor unless otherwise indicated.
2. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, and down; connect to horizontal bus.

E. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
3. Connections to Structural Steel: Welded connectors.

3.2 GROUNDING AT THE SERVICE

A. Equipment grounding conductors and grounding electrode conductors shall be connected to the ground bus. Install a main bonding jumper between the neutral and ground buses.

3.3 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with the ll equipment for those required by NFPA 70:

B. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.

C. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.

D. Isolated Grounding Receptacle Circuits: Install an insulated equipment grounding conductor connected to the receptacle grounding terminal. Isolate conductor from raceway and from panel board grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service unless otherwise indicated.

E. Poles Supporting Outdoor Lighting Fixtures: Install grounding electrode and a separate insulated equipment grounding conductor in addition to grounding conductor installed with branch-circuit conductors.

F. Metallic Fences: Comply with requirements of IEEE C2.

1. Grounding Conductor: Bare copper, not less than No. 8 AWG.
2. Gates: Shall be bonded to the grounding conductor with a flexible bonding jumper.
3. Barbed Wire: Strands shall be bonded to the grounding conductor.

3.4 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Ground Bonding Common with Lightning Protection System: Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system. Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor, and install in conduit.

C. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.

1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.

D. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.

1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
2. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.

E. Grounding and Bonding for Piping:

1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.

F. Grounding for Steel Building Structure: Install a driven ground rod at base of each corner column and at intermediate exterior columns at distances not more than 60 feet apart.

3.5 FIELD QUALITY CONTROL

A. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

B. Tests and Inspections:

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.

2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at individual ground rods. Make tests at ground rods before any conductors are connected.

    a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
    b. Perform tests by fall-of-potential method according to IEEE 81.

4. Prepare dimensioned Drawings locating each test well, ground rod and ground-rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

C. Grounding system will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

E. Report measured ground resistances that exceed the following values:

1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.
2. Power and Lighting Equipment or System with Capacity of 500 to 1000 kVA: 5 ohms.
3. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 ohms.
4. Power Distribution Units or Panel boards Serving Electronic Equipment: 1 ohm(s).
5. Substations and Pad-Mounted Equipment: 5 ohms.
6. Manhole Grounds: 10 ohms.

F. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 26 05 26

SECTION 26 05 33 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Metal conduits, tubing, and fittings.
2. Nonmetal conduits, tubing, and fittings.
3. Surface raceways (Legrand/Wiremold).
4. Boxes, enclosures, and cabinets.
5. Handholes and boxes for exterior underground cabling.

1.3 DEFINITIONS

A. ARC: Aluminum rigid conduit.

B. GRC: Galvanized rigid steel conduit.

C. IMC: Intermediate metal conduit.

PART 2 - PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

A. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. IMC: Comply with ANSI C80.6 and UL 1242.

C. EMT: Comply with ANSI C80.3 and UL 797.

D. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.

1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886 and NFPA 70.
2. Fittings for EMT:

a. Material: Steel or die cast.
b. Type: Compression as manufactured by Thomas and Betts. No set screw type fittings allowed for MC Cable, clamp style connectors only. Indenture type fittings will not be allowed.

3. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
4. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch, with overlapping sleeves protecting threaded joints.

E. Joint Compound for IMC, GRC, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS, TUBING, AND FITTINGS

A. Listing and Labeling: Nonmetallic conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.

C. Fittings for ENT and RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.

2.3 SURFACE RACEWAYS

A. Listing and Labeling: Surface raceways and tele-power poles shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1. Legrand/Wiremold steel raceway, 500 and 700 series.

2.4 BOXES, ENCLOSURES, AND CABINETS

A. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.

B. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.

C. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.

D. Metal Floor Boxes:

1. Material: Cast metal or sheet metal.
2. Type: Fully adjustable.
3. Shape: Rectangular.
4. Listing and Labeling: Metal floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

E. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb. Outlet boxes designed for attachment of luminaires weighing more than 50 lb shall be listed and marked for the maximum allowable weight.

F. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, galvanized, cast iron with gasketed cover.

G. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1 with continuous-hinge cover with flush latch unless otherwise indicated.

2.5 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

A. General Requirements for Handholes and Boxes:

1. Boxes and handholes for use in underground systems shall be designed and identified as defined in NFPA 70, for intended location and application.
2. Boxes installed in wet areas shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Polymer-Concrete Handholes and Boxes with Polymer-Concrete Cover: Molded of sand and aggregate, bound together with polymer resin, and reinforced with steel, fiberglass, or a combination of the two.

1. Standard: Comply with SCTE 77.
2. Configuration: Designed for flush burial with open bottom unless otherwise indicated.
3. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure and handhole location.
4. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
5. Cover Legend: Molded lettering, "ELECTRIC.".
6. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.
7. Handholes 12 Inches Wide by 24 Inches Long and Larger: Have inserts for cable racks and pulling-in irons installed before concrete is poured.

C. Fiberglass Handholes and Boxes: Molded of fiberglass-reinforced polyester resin, with frame and covers of polymer concrete.

1. Standard: Comply with SCTE 77.
2. Color of Frame and Cover: Gray.
3. Configuration: Designed for flush burial with open bottom unless otherwise indicated.

4. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure and handhole location.
5. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
6. Cover Legend: Molded lettering, "ELECTRIC.".
7. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.
8. Handholes 12 Inches Wide by 24 Inches Long and Larger: Have inserts for cable racks and pulling-in irons installed before concrete is poured.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION AND INSTALLATION

A. Electrical metallic tubing shall not be installed underground, encased in concrete, used in areas where subject to severe physical damage, or used in outdoor work, or used exposed up to 7 feet above interior floors or walk-ways.:

B. Nonmetallic conduit shall be used only where specifically indicated or specified for special situations or systems.

C. Underground conduits shall be PVC type EB with 3" concrete encasement, rigid galvanized steel or steel IMC with half lap (0.010 inch thick) pressure sensitive plastic tape or two coats of bitumastic.

D. Conduit in or under floor slabs shall be rigid steel or steel IMC or Schedule 40 P.V.C.

E. Service entrance conduit shall be rigid steel or IMC or PVC, Type EB from the service equipment to the outdoor transformer and not less than 24 inches below grade.

F. Unless indicated otherwise, conceal conduit within finished walls, ceilings, and floors. Keep conduit at least 6 inches away from parallel runs of flues, hot water or refrigerant piping. Install conduit that will be visible after completion of project parallel with or at right angles to ceilings, walls, and structural members.

G. Support Conduit by pipe straps, wall brackets, hangers, or ceiling trapeze. Fasten by wood screws to wood; by toggle bolts on hollow masonry units; by concrete inserts or expansion bolts on concrete or brick; by machine screws, welded threaded studs, or spring-tension clamps on steel work. Threaded C-clamps may be used on rigid steel conduit only. Do not weld conduits or pipe straps to steel structures. Fill holes that are not used. In partitions of light steel construction, use sheetmetal screws. In suspended ceiling construction, run conduit above the ceiling and fasten only lighting system branch circuit conduits to the ceiling supports. Spring steel fasteners may be used for lighting branch circuit conduit supports in suspended ceiling in dry locations.

H. Make changes in direction of runs with symmetrical bends or cast metal fittings. Make field bends and offsets with a hickey or conduit-bending machine. Do not install crushed or deformed conduits. Avoid trapped conduits.

I. Install pull wires in empty conduits in which wire is to be installed by others. The pull wire shall be No. 14 AWG zinc-coated steel or plastic having not less than 200 pounds tensile strength. Leave not less than 12 inches of slack at each end of the pull wire.

J. Telephone and signal system conduits shall be installed in accordance with the previous requirements for conduit and with the additional requirement that no length of run shall exceed 150 feet for conduit sizes 1 inch and smaller and shall not contain more than two 90 degree bends or the equivalent. Install pull or junction boxes to comply with these requirements. Inside radii of bends in conduits one inch and larger shall be not less than two times the nominal diameter. Minimum size conduit shall be 3/4". Terminate conduit at bottom edge of backboard or connect into telephone equipment cabinets where applicable.

K. Conduit installed in concrete floor slabs shall be located so as not to adversely affect the structural strength of the slabs. Install conduit within the middle one-third of the concrete slab. Do not stack conduits. Space conduits horizontally not closer than three diameters except at cabinet locations. Curved portions of bends shall not be visible above the finish slab. Increase slab thickness as necessary to provide a minimum one-inch cover over conduit. Where embedded conduits cross expansion joints, provide 0.Z, Type "AX" expansion fitting or approved equal. Conduit larger than one-inch trade size shall be parallel with or at right angles to the main reinforcement; when at right angles to the reinforcement, the conduit shall be close to one of the supports of the slab.

L. Fasten conduits to sheet metal boxes and cabinets with two locknuts where required by NFPA 70, where insulated bushings are used, and where bushings cannot be brought into firm contact with the box, otherwise use at least a single locknut and bushing. Locknuts shall be the type with sharp edges for digging into the wall of metal enclosures. Install bushings on the ends of conduits and provide insulating type where required by NFPA 70.

M. Provide conduits stubbed up through concrete floor for connection to freestanding equipment with an adjustable top or an inside threaded coupling for plugs, set flush with the finished floor. Extend conductors to equipment in rigid steel conduit, except that flexible metal conduit may be used 6 inches above the floor. Where no equipment connections are made, install screwdriver-operated threaded flush plugs in conduit end.

N. Flexible connections of short length shall be provided for equipment subject to vibration, noise transmission, or movement and for all motors. Liquid-tight flexible conduit shall be used in wet locations. A separate ground conductor shall be provided across all flexible connections.

O. No homerun conduit shall be smaller than 3/4 inch unless specified on the Drawings. Conduit runs for lighting systems, shall not contain more than (6) six circuits per conduit.

P. In general, the conduit installation shall follow the layout shown on the Plans. This layout is, however, diagrammatic only, and where changes are necessary due to structural conditions, other apparatus or other causes, such changes shall be made

without any additional cost to the Owner. Offsets in conduits are not indicated and must be furnished as required.

Q. Conduits shall be secured in place and protected where necessary to prevent damage to the work during construction. The ends of all conduit runs shall be plugged with cork or plastic stoppers to avoid filling with plaster or debris. All conduits shall be blown out and swabbed clear of water and debris prior to pulling wire.

R. Surface exposed conduit shall be rigid up to 7'-0" A.F.F. All conduit penetrating the finished slab and exposed shall be rigid conduit including a rigid 90 degree elbow under the slab.

S. MC Cable (flexible conduit) shall only be used from junction box to equipment, **ONLY**. (equipment whips)

T. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
3. EMT: Use setscrew or compression, steel fittings. Comply with NEMA FB 2.10.
4. Steel surface mounted raceway, shall be 500 and 700 series Legrand/Wiremold fittings.

U. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.

V. Install surface raceways only where indicated on Drawings.

W. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F.

X. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.

Y. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

Z. Complete raceway installation before starting conductor installation.

AA. Arrange stub-ups so curved portions of bends are not visible above finished slab.

BB. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.

CC. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

DD. Support conduit within 12 inches of enclosures to which attached.

EE. Raceways Embedded in Slabs:

1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10-footintervals.
2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
3. Arrange raceways to keep a minimum of 1 inch of concrete cover in all directions.
4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.
5. Change from ENT to IMC before rising above floor.

FF. Stub-ups to Above Recessed Ceilings:

1. Use EMT, IMC, or RMC for raceways.
2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

GG. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

HH. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.

II. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch trade size and insulated throat metal bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.

JJ. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.

KK. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.

LL. Cut conduit perpendicular to the length. For conduits 2-inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.

MM. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

NN. Surface Raceways:

1. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inches and with no less than two supports per straight raceway section. Support surface raceway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.

OO. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.

PP. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where an underground service raceway enters a building or structure.
3. Where otherwise required by NFPA 70.

QQ. Comply with manufacturer's written instructions for solvent welding RNC and fittings.

RR. Expansion-Joint Fittings:

1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F and that has straight-run length that exceeds 25 feet. Install in each run of aboveground RMC and EMT conduit that is located where environmental temperature change may exceed 100 deg F and that has straight-run length that exceeds 100 feet.
2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:

    a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
    b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.
    c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F temperature change.
    d. Attics: 135 deg F temperature change.

3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F of temperature change for metal conduits.
4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

SS. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.

TT. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.

UU. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

VV. Locate boxes so that cover or plate will not span different building finishes.

WW. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

XX. Set metal floor boxes level and flush with finished floor surface.

3.2 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Section 31 20 00 "Earth Moving" for pipe less than 6 inches in nominal diameter.
2. Install backfill as specified in Section 31 20 00 "Earth Moving."
3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Section 31 20 00 "Earth Moving."
4. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through floor unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.
5. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.

    a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete for a minimum of 12 inches on each side of the coupling.
    b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.

6. Warning Planks: Bury warning planks approximately 12 inches above direct-buried conduits but a minimum of 6 inches below grade. Align planks along centerline of conduit.
7. Underground Warning Tape: Comply with requirements in Section 26 05 53 "Identification for Electrical Systems."

3.3 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.

B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.

C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch above finished grade.

D. Install handholes with bottom below frost line.

E. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables but short enough to preserve adequate working clearances in enclosure.

F. Field-cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

3.4 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies.

3.5 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 07 84 13 "Penetration Firestopping."

3.6 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.

2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer

END OF SECTION 26 05 33

SECTION 26 05 53 – ELECTRICAL GENERAL REQUIREMENTS – (NATIONAL ACCOUNT)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. National Accounts

1. All references to ABB equipment only apply to new construction.

B. Applicable Publications

1. All products and installation in this Division will be governed by the following:

a. National Electrical Code
b. American National Standards Institute (ANSI)
c. American Society For Testing and Materials (ASTM)
d. National Electrical Manufacturer's Association (NEMA)
e. Underwriter's Laboratories, Inc. (U.L.)
f. International Building Codes
g. National Fire Protection Association (NFPA)

C. Codes and Permits

1. The electrical systems shall comply with the National Electric Code, latest edition, with the regulations of the supplying utility company, and with all applicable state, county, and municipal codes, as well as with the plans. In the event of any conflict between these codes, regulations and plans, the most restrictive shall apply. The Contractor shall deliver to the Architect and Food lion three (3) copies of a certificate of approval by the local inspection agency before receiving final payment. The Contractor shall pay all permit, inspection, and license fees.

D. Verification of Dimensions

1. Coordinate this trade's work to the building structure and to the work of all trades. Visit the premises and become familiar with the dimensions in the field, and advise the owner of any discrepancy before performing any work. Beginning of work constitutes acceptance of existing conditions, and that all work can be performed as specified. Any changes needed and/or made at the electrical contractors discretion shall be done at no charge to the owner or Food lion.

E. Materials

1. Materials and equipment shall be cataloged products of manufacturers regularly engaged in production of such materials or equipment and shall be manufacturer's latest design that complies with the specification requirements. Materials and equipment shall duplicate items that have been in satisfactory commercial or industrial use. Where two or more items of the same class of equipment are required, these items shall be products of a single manufacturer; however, the component parts of the items need not be the products of the same manufacturer. Each item of equipment shall have the manufacturer's name, address, model number, and serial number on the nameplate securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.
2. All materials shall be new, and shall bear the seal of the Underwriter's Laboratories.
3. All electrical Power Walls and Panel boards shall consist of ABB “Spectra Series” components. No other component manufacturer is acceptable. Contact ABB for information.

1.3 ACTION SUBMITTALS

A. Product Data: For each electrical identification product indicated.

1.4 QUALITY ASSURANCE

A. Comply with ANSI A13.1 and IEEE C2.

B. Comply with NFPA 70.

C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

D. Comply with ANSI Z535.4 for safety signs and labels.

E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

1.5 COORDINATION

A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.

B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

C. Coordinate installation of identifying devices with location of access panels and doors.

D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 POWER RACEWAY IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.

B. Colors for Raceways Carrying Circuits at 600 V or Less:

1. Black letters on an orange field.
2. Legend: Indicate voltage and system or service type.

C. Self-Adhesive Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

2.2 ARMORED AND METAL-CLAD CABLE IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.

B. Colors for Raceways Carrying Circuits at 600 V and Less:

1. Black letters on an orange field.
2. Legend: Indicate voltage and system or service type.

C. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

D. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; 2 inches wide; compounded for outdoor use.

2.3 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.

B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

2.4 CONDUCTOR IDENTIFICATION MATERIALS

A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.

B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

C. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

D. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

E. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

F. Write-On Tags: Polyester tag, 0.015 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.

1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

2.5 FLOOR MARKING TAPE

A. 2-inch- wide, 5-mil pressure-sensitive vinyl tape, with black and white stripes and clear vinyl overlay.

2.6 WARNING LABELS AND SIGNS

A. Comply with NFPA 70 and 29 CFR 1910.145.

B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.

C. Warning label and sign shall include, but are not limited to, the following legends:

1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."

2.7 INSTRUCTION SIGNS

A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch thick for signs up to 20 sq. inches and 1/8 inch thick for larger sizes.

1. Engraved legend with black letters on white face.
2. Punched or drilled for mechanical fasteners.
3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.8 EQUIPMENT IDENTIFICATION LABELS

A. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch.

B. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch. Overlay shall provide a weatherproof and UV-resistant seal for label.

C. Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch.

D. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on a dark-gray background. Minimum letter height shall be 3/8 inch.

E. Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height shall be 1 inch.

F. The Electrical Contractor shall provide a typed listing of each panel schedule. Affix panel schedule to the inside of each electric switch panel. Cover this schedule with clear plastic.

2.9 PAINTING OF EQUIPMENT

A. Equipment painting, factory applied or shop applied, shall be as specified herein, and provided under each individual section of this specification.

1. Factory painting systems: Manufacturer's standard factory painting system is acceptable.
2. Shop painting systems: Clean, pretreat, prime, and paint metal surfaces; with the exception of aluminum surfaces which shall not be painted. Apply coatings to clean dry surfaces. Clean the surfaces to remove dust, dirt, rust, oil, and grease by wire brushing and solvent degreasing prior to application of paint. Metal surfaces subject to temperatures in excess of 120 degrees Fahrenheit (F) shall be cleaned to bare metal. Where more than one coat of paint is specified, apply the second coat after the preceding coat is thoroughly dry. Lightly sand damaged painting and retouch before applying the succeeding coat.

PART 3 - EXECUTION

3.1 DELIVERY AND STORAGE

A. Properly store, adequately protect and carefully handle equipment and materials to prevent damage before and during installation.

B. Handle, store, and protect equipment and materials in accordance with the manufacturer's recommendations. Replace damaged or defective items at no charge to the owner, or Food lion.

3.2 INSTALLATION

A. Verify identity of each item before installing identification products.

B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

C. Apply identification devices to surfaces that require finish after completing finish work.

D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.

E. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.

F. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.

G. Painted Identification: Comply with requirements in painting Sections for surface preparation and paint application.

H. Workmanship: All work shall be executed in a workmanlike manner and shall present a neat appearance upon completion as determined by the Food Lion Construction Manager. The Contractor shall work closely with the Refrigeration Contractor when making connections to the Refrigeration equipment.

3.3 IDENTIFICATION SCHEDULE

A. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits More Than 30 A, and 120 V to ground: Identify with self-adhesive vinyl label. Install labels at 30-foot maximum intervals.

B. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage. System legends shall be as follows:

1. Emergency Power.
2. Power.
3. UPS.

C. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and hand holes, use color-coding conductor tape to identify the phase.

1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded service feeder and branch-circuit conductors.

a. Color shall be factory applied or field applied for sizes larger than No. 8 AWG, if authorities having jurisdiction permit.
b. Colors for 208/110-V Circuits:

1) Phase A: Black.
2) Phase B: Red.
3) Phase C: Blue.

c. Colors for 403/117-V Circuits:

1) Phase A: Brown.
2) Phase B: Orange.
3) Phase C: Yellow.

d. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

D. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panel boards and similar equipment in finished spaces.

E. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels.

1. Comply with 29 CFR 1910.145.
2. Identify system voltage with black letters on an orange background.
3. Apply to exterior of door, cover, or other access.
4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:

a. Power transfer switches.

b. Controls with external control power connections.

F. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.

G. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.

1. Labeling Instructions:

a. Indoor Equipment: Engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on 1-1/2-inch- high label; where two lines of text are required, use labels 2 inches high.
b. Outdoor Equipment: Engraved, laminated acrylic or melamine label Stenciled legend 4 inches high.
c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
d. Fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.

2. Equipment to Be Labeled:

a. Panel boards: Typewritten directory of circuits in the location provided by panel board manufacturer. Panel board identification shall be engraved, laminated acrylic or melamine label.
b. Enclosures and electrical cabinets.
c. Switchgear.
d. Switchboards.

3.4 TESTS

A. After the electrical work is completed and at such time as the Architect, Owner, or Food Lion Construction Manager may direct, the Contractor shall conduct an operating test for approval. The tests shall be performed in the presence of the authorized representative of the Owner and Food Lion. The installation shall be demonstrated to operate in accordance with the requirements of this specification. The Contractor shall furnish all instruments and personnel required for the test. The Contractor shall have sufficient tools and personnel available at the scheduled inspection to remove panel fronts, device plates, etc., as required for proper inspection of equipment, devices, and wiring installation as required by the inspectors. Any material or workmanship that does not meet the approval of the Architect/Owner or Food Lion shall be promptly removed, repaired or replaced as directed at no additional cost to the Owner.

3.5 TELEPHONE CONDUIT AND WIRING SYSTEMS

A. Telephone Conduit and Wiring Systems must be installed by scheduled installation date. Any delays caused by Contractor to Food Lion will be the responsibility of the Contractor, at the rate of $50.00 per man-hour, 50¢ per mile, plus lodging and expenses.

3.6 FIRE ALARM

A. Fire Alarm conduits as shown on plans.

3.7 BURGLAR ALARM

A. Burglar Alarm conduits as shown on plans.

3.8 REMOVAL

A. When work has been completed and approved, the electrical contractor shall remove all surplus materials, scaffolds, etc. from the premises. All switchbox covers shall be in place and closed. Deliver all keys to the panel box doors to the Food Lion representative. All device plates and equipment access covers shall be properly closed and no accidental access to electrical current shall be possible.

3.9 CLEANING

A. Clean up any discarded wire, conduit, connections, insulation, etc. from all areas of the store and roof. Leave the rooftop electrical center broom clean.

3.10 EXCAVATING AND BACK FILLING

A. This Contractor shall do all excavating and backfilling required for the installation of the electrical work not provided by the Utility.

B. Backfill shall be done in layers of 12 inches fill, wetted down and tamped for each consecutive layer up to grade, to 90% standard compaction or greater as required by the Architect.

C. This Contractor shall pay all costs in connection with repairing paving damaged in the process of installing electrical work.

D. Excavations shall be filled as soon as possible and not left open for prolonged periods.

E. Provide warning barricades around all open trenches and holes before leaving unattended. Do not leave exposed wiring in a trench unattended.

END OF SECTION 26 05 53

SECTION 26 24 16 – PANEL BOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Distribution panel boards.
2. Lighting and appliance branch-circuit panel boards.

1.3 DEFINITIONS

A. SVR: Suppressed voltage rating.

B. TVSS: Transient voltage surge suppressor.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of panel board, switching and overcurrent protective device, transient voltage suppression device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For each panel board and related equipment.

1. Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.
2. Detail enclosure types and details for types other than NEMA 250, Type 1.
3. Detail bus configuration, current, and voltage ratings.
4. Short-circuit current rating of panel boards and overcurrent protective devices.
5. Include evidence of NRTL listing for series rating of installed devices.
6. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
7. Include wiring diagrams for power, signal, and control wiring.
8. Include time-current coordination curves for each type and rating of overcurrent protective device included in panel boards. Submit on translucent log-log graft paper; include selectable ranges for each type of overcurrent protective device.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified testing agency.

B. Seismic Qualification Certificates: Submit certification that panelboards, overcurrent protective devices, accessories, and components will withstand seismic forces. Include the following:

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Field Quality-Control Reports:

1. Test procedures used.
2. Test results that comply with requirements.
3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

D. Panel board Schedules: For installation in panel boards. Submit final versions after load balancing.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For panel boards and components to include in emergency, operation, and maintenance manuals, including the following:

1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
2. Time-current curves, including selectable ranges for each type of overcurrent protective device that allows adjustments.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Keys: Two spares for each type of panel board cabinet lock.
2. Circuit Breakers Including GFCI and Ground Fault Equipment Protection (GFEP) Types: Six spares for each panel board.
3. Fuses for Fused Switches: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.
4. Fuses for Fused Power-Circuit Devices: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.

1.8 QUALITY ASSURANCE

A. Testing Agency Qualifications: Member company of NETA or an NRTL.

1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.

B. Source Limitations: Obtain panel boards, overcurrent protective devices, components, and accessories from single source from single manufacturer.

C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for panel boards including clearances between panel boards and adjacent surfaces and other items. Comply with indicated maximum dimensions.

D. 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.

E. Comply with NEMA PB 1.

F. Comply with NFPA 70.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Remove loose packing and flammable materials from inside panel boards; install temporary electric heating (250 W per panel board) to prevent condensation.

B. Handle and prepare panel boards for installation according to NECA 407.

1.10 PROJECT CONDITIONS

A. Environmental Limitations:

1. Do not deliver or install panel boards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above panel boards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:

a. Ambient Temperature: Not exceeding minus 22 deg F to plus 104 deg F.
b. Altitude: Not exceeding 6600 feet.

B. Service Conditions: NEMA PB 1, usual service conditions, as follows:

1. Ambient temperatures within limits specified.
2. Altitude not exceeding 6600 feet.

C. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:

1. Notify Construction Manager no fewer than two days in advance of proposed interruption of electric service.
2. Do not proceed with interruption of electric service without Construction Manager's written permission.
3. Comply with NFPA 70E.

1.11 COORDINATION

A. Coordinate layout and installation of panel boards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.

1.12 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace transient voltage suppression devices that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

1.13 GENERAL REQUIREMENTS

A. The internal wiring system within the building shall be three phase, four wire wye, 120/208 volts unless local utility company regulations require a different voltage or voltages.

B. If local regulations require another voltage or voltages, the Contractor shall submit shop drawings showing proposed arrangement and sizes of service entrance conductors and raceways, service entrance equipment, feeders, branch-circuit panel boards, and branch circuits. This proposed arrangement shall comply with local regulations and codes, and shall provide equal or greater capacity with equal or less voltage drop as the arrangement specified.

C. The service shall be underground to a pad-mount transformer at the rear of the building. The location of pad-mount transformers shall be coordinated with use of the parking lot and loading space and shall be approved by Food Lion before installation. Overhead power lines shall be a minimum distance of 18' above driveways. In the

event any charge is made by the utility company for providing service at the rear of the building, the amount of this charge shall be included in the contract price and paid by the Contractor. No overhead electrical service shall be allowed.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PANELBOARDS

A. Fabricate and test panel boards according to IEEE 344 to withstand seismic forces.

B. Enclosures: Flush- and surface-mounted cabinets.

1. Rated for environmental conditions at installed location.

    a. Indoor Dry and Clean Locations: NEMA 250, Type 1.
    b. Outdoor Locations: NEMA 250, Type 3R.
    c. Kitchen Wash-Down Areas: NEMA 250, Type 4X, stainless steel.
    d. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.
    e. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 5.

2. Front: Fronts shall be reinforced steel powder finish painted ANSI-61 gray and shall be equipped with concealed hinges and concealed trim adjusting screws---trim clamps are not an acceptable alternative.
3. Skirt for Surface-Mounted Panel boards: Same gage and finish as panel board front with flanges for attachment to panel board, wall, and ceiling or floor.
4. Gutter Extension and Barrier: Same gage and finish as panel board enclosure; integral with enclosure body. Arrange to isolate individual panel sections.
5. Finishes:

    a. Panels and Trim: Steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
    b. Back Boxes: Same finish as panels and trim.
    c. Fungus Proofing: Permanent fungicidal treatment for overcurrent protective devices and other components.

6. Directory card holders shall be clear Lexan permanently mounted to the front door and all door locks shall be corrosion proof Valox with retractable latch, keyed alike.
7. For new construction, all panel boards shall be ABB equipment. No other manufacturer is acceptable.
8. In existing stores, new equipment is to match existing equipment or insure 100% compatibility.
9. Panel boards as shown on plans and described herein shall be GE A-Series Type AQ or AE. Panel boards shall be listed by Underwriters Laboratories, Inc.
10. Boxes shall be corrosion resistant, zinc finish galvanneal, 20 inches wide with wire bending space per NEC.

C. Incoming Mains Location: Top and bottom.

D. Phase, Neutral, and Ground Buses:

1. Material: Tin-plated aluminum.
2. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.
3. Isolated Ground Bus: Adequate for branch-circuit isolated ground conductors; insulated from box.
4. Neutral Bus: Neutral bus rated 100 percent of phase bus.
5. Bus bars shall be sequenced phased, fully insulated and supported by high impact Noryl interior base assemblies, mechanically supported by reinforced zinc finished galvanneal steel frames to prevent vibration and resulting damage when subjected to vibration or short circuits. All terminations shall be suitable for either copper or aluminum UL listed wire and shall be tested and listed in conjunction with appropriate UL Standards. Bus bars shall be copper.

E. Conductor Connectors: Suitable for use with conductor material and sizes.

1. Material: Tin-plated aluminum.
2. Main and Neutral Lugs: Mechanical type.
3. Ground Lugs and Bus-Configured Terminators: Mechanical type.
4. Feed-Through Lugs: Mechanical type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.
5. Subfeed (Double) Lugs: Mechanical type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.
6. Gutter-Tap Lugs: Mechanical type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.
7. Neutral Bus: Neutral bus rated 100 percent of phase bus.

F. Service Equipment Label: NRTL labeled for use as service equipment for panel boards with one or more main service disconnecting and overcurrent protective devices.

G. Panel board Short-Circuit Current Rating: Rated for series-connected system with integral or remote upstream overcurrent protective devices and labeled by an NRTL. Include size and type of allowable upstream and branch devices, listed and labeled for series-connected short-circuit rating by an NRTL.

2.2 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Panel boards shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

B. Surge Suppression: Factory installed as an integral part of indicated panel boards, complying with UL 1449 SPD Type 1.

2.3 DISTRIBUTION PANELBOARDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following, ABB:

B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. ABB Company

C. Panel boards: NEMA PB 1, power and feeder distribution type.

D. Doors: Secured with vault-type latch with tumbler lock; keyed alike.

1. For doors more than 36 inches high, provide two latches, keyed alike.

E. Mains: Circuit breaker or Lugs only.

F. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes 125 A and Smaller: Bolt-on circuit breakers.

G. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers; plug-in circuit breakers where individual positive-locking device requires mechanical release for removal.

H. Branch Overcurrent Protective Devices: Fused switches.

2.4 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following ABB:

B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. ABB.

C. Panel boards: NEMA PB 1, lighting and appliance branch-circuit type.

D. Mains: Circuit breaker or lugs only.

E. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.

F. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

G. Column-Type Panel boards: Narrow gutter extension, with cover, to overhead junction box equipped with ground and neutral terminal buses.

2.5 CIRCUIT BREAKERS

A. Circuit breakers shall not be restricted to any mounting location due to their physical size and all branch circuit breakers rated 15 through 100 ampere shall be capable of mounting in any and all interior positions to allow twin or double mounting without space penalty. All branch circuit breaker panel board connections shall be copper to copper connections, with all panel board terminations being fully rated at 100 amperes. All branch circuit breakers shall be quick make and quick break and have handle trip indication.

2.6 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following, ABB.

B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. ABB.

C. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with series-connected rating to meet available fault currents.

1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
3. Electronic trip circuit breakers with rms sensing; field-replaceable rating plug or field-replicable electronic trip; and the following field-adjustable settings:

    a. Instantaneous trip.
    b. Long- and short-time pickup levels.
    c. Long- and short-time time adjustments.
    d. Ground-fault pickup level, time delay, and I^2t response.

4. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.
5. GFCI Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).
6. Ground-Fault Equipment Protection (GFEP) Circuit Breakers: Class B ground-fault protection (30-mA trip).
7. Arc-Fault Circuit Interrupter (AFCI) Circuit Breakers: Comply with UL 1699; 120/240-V, single-pole configuration.
8. Molded-Case Circuit-Breaker (MCCB) Features and Accessories:

    a. Standard frame sizes, trip ratings, and number of poles.
    b. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
    c. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge (HID) lighting circuits.

d. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
e. Shunt Trip: 120-V trip coil energized from separate circuit, set to trip at 55 percent of rated voltage.
f. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage without intentional time delay.
g. Auxiliary Contacts: One SPDT switch with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts and "b" contacts operate in reverse of circuit-breaker contacts.
h. Alarm Switch: Single-pole, normally open contact that actuates only when circuit breaker trips.
i. Key Interlock Kit: Externally mounted to prohibit circuit-breaker operation; key shall be removable only when circuit breaker is in off position.
j. Zone-Selective Interlocking: Integral with electronic trip unit; for interlocking ground-fault protection function with other upstream or downstream devices.
k. Multipole units enclosed in a single housing or factory assembled to operate as a single unit.
l. Handle Padlocking Device: Fixed attachment, for locking circuit-breaker handle in on or off position.
m. Handle Clamp: Loose attachment, for holding circuit-breaker handle in on position.

D. Fused Switch: NEMA KS 1, Type HD; clips to accommodate specified fuses; lockable handle.

1. Fuses, and Spare-Fuse Cabinet: Comply with requirements specified in Section 26 28 13 "Fuses."
2. Fused Switch Features and Accessories: Standard ampere ratings and number of poles.
3. Auxiliary Contacts: One normally open and normally closed contact(s) that operate with switch handle operation.

E. GENERAL

1. Provide where shown and where required, safety switches for disconnecting motors or feeders. Where other means are provided for short circuit current protection of motors and conductors, furnish fuse less disconnect switches of horsepower rating as required. Switches for fractional horsepower motors shall be 20 ampere toggle switches. For larger motors, switches shall be type "TD" quickmake, quick-break, with cover interlock. Switches shall be ABB except in Meat Prep (see approved construction documents for Meat Prep disconnects). Enclosures shall be appropriate for conditions where located. Mount disconnect so the top of the operations handle does not exceed 6'-6" above a maintenance accessible surface in its highest position.

2.7 ACCESSORY COMPONENTS AND FEATURES

A. Accessory Set: Include tools and miscellaneous items required for overcurrent protective device test, inspection, maintenance, and operation.

B. Portable Test Set: For testing functions of solid-state trip devices without removing from panel board. Include relay and meter test plugs suitable for testing panel board meters and switchboard class relays.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Receive, inspect, handle, and store panel boards according to NECA 407.

B. Examine panel boards before installation. Reject panel boards that are damaged or rusted or have been subjected to water saturation.

C. Examine elements and surfaces to receive panel boards for compliance with installation tolerances and other conditions affecting performance of the Work.

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

3.2 INSTALLATION

A. Install panel boards and accessories according to NECA 407.

B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from panel boards.

C. Comply with mounting and anchoring requirements specified by code and AHJ.

D. Mount top of trim 90 inches above finished floor unless otherwise indicated.

E. Mount panel board cabinet plumb and rigid without distortion of box. Mount recessed panel boards with fronts uniformly flush with wall finish and mating with back box.

F. Install overcurrent protective devices and controllers not already factory installed.

1. Set field-adjustable, circuit-breaker trip ranges.

G. Install filler plates in unused spaces.

H. Stub four 1-inch (27-GRC) empty conduits from panel board into accessible ceiling space or space designated to be ceiling space in the future. Stub four 1-inch (27-GRC) empty conduits into raised floor space or below slab not on grade.

I. Arrange conductors in gutters into groups and bundle and wrap with wire ties after completing load balancing.

J. Comply with NECA 1.

3.3 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs

B. Create a directory to indicate installed circuit loads after balancing panel board loads; incorporate Owner's final room designations. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.

C. Panel board Nameplates: Label each panel board with a nameplate.

D. Device Nameplates: Label each branch circuit device in distribution panel boards with a nameplate.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

B. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

C. Acceptance Testing Preparation:

1. Test insulation resistance for each panel board bus, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

D. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
3. Perform the following infrared scan tests and inspections and prepare reports:

    a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each panel board. Remove front panels so joints and connections are accessible to portable scanner.
    b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each panel board 11 months after date of Substantial Completion.
    c. Instruments and Equipment:

1) Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

E. Panel boards will be considered defective if they do not pass tests and inspections.

F. Prepare test and inspection reports, including a certified report that identifies panel boards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 ADJUSTING

A. Adjust moving parts and operable component to function smoothly, and lubricate as recommended by manufacturer.

B. Set field-adjustable circuit-breaker trip ranges as indicated

C. Load Balancing: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes.

1. Measure as directed during period of normal system loading.
2. Perform load-balancing circuit changes outside normal occupancy/working schedule of the facility and at time directed. Avoid disrupting critical 24-hour services such as fax machines and on-line data processing, computing, transmitting, and receiving equipment.
3. After circuit changes, recheck loads during normal load period. Record all load readings before and after changes and submit test records.
4. Tolerance: Difference exceeding 20 percent between phase loads, within a panel board, is not acceptable. Rebalance and recheck as necessary to meet this minimum requirement.

3.6 PROTECTION

A. Temporary Heating: Apply temporary heat to maintain temperature according to manufacturer's written instructions.

END OF SECTION 26 24 16

SECTION 26 27 26 - WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Receptacles, receptacles with integral GFCI, and associated device plates.
2. Isolated-ground receptacles.
3. Weather-resistant receptacles.
4. Snap switches and wall-box dimmers.
5. Pendant cord-connector devices.
6. Cord and plug sets.
7. Floor service outlets, poke-through assemblies, service poles, and multioutlet assemblies.

1.3 DEFINITIONS

A. GFCI: Ground-fault circuit interrupter.

B. Pigtail: Short lead used to connect a device to a branch-circuit conductor.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Receptacles for Owner-Furnished Equipment: Match plug configurations.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing-label warnings and instruction manuals that include labeling conditions.

PART 2 - PRODUCTS

2.1 GENERAL WIRING-DEVICE REQUIREMENTS

A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

C. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:

1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.
2. Devices shall comply with the requirements in this Section.

2.2 STRAIGHT-BLADE RECEPTACLES

A. Duplex convenience receptacles shall be 20 ampere Parallel-slot, double contact and ground type with white phenolic body, Bryant, Hubbell #5262. Provide mating cap for each receptacle or cord body other than convenience receptacles, of type described in Legend. All wall-mounted receptacles shall be mounted at 1'-4" above finished floor unless otherwise shown. Receptacles in sales area and other finished areas shall be equipped with device plates of .035" thickness satin finished stainless steel, 18-8, type 302, Bryant, or Hubbell #93000 series. Plates on condulet bodies shall be cadium-plated sheet steel. Receptacles in damp locations (coolers, freezers, prep areas, etc.) shall have weatherproof covers equal to Hubbell #5205.

B. Isolated-ground receptacles are available in a variety of configurations and ratings including locking-blade types up to 50 A and 250 V. Revise "Isolated-Ground, Duplex Convenience Receptacles, 125 V, 20 A" Paragraph below to suit Project; indicate different types on Drawings. Receptacles for clean power shall be orange with orange cover plates.

C. Isolated-Ground, Duplex Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.

1. Description: Straight blade; equipment grounding contacts shall be connected only to the green grounding screw terminal of the device and with inherent electrical isolation from mounting strap. Isolation shall be integral to receptacle construction and not dependent on removable parts.

D. Outlets shall be installed at locations as shown. Mount all outlet boxes 1'-4" above finished floor except as noted on plans. Each outlet shall be installed in an approved box of type and size to suit requirements of the drawings and details, and in accordance with code requirements. Locations of outlets are schematic and actual locations shall be verified on the job, unless actual dimensions are shown on the drawing. Prior to installation, the Architect or Food Lion may change the location of any outlet by as much as ten feet without additional cost to the Owner. Surface mounted boxes shall be cast metal threaded hub boxes, "Condulet", or "Unilets", when 7'0" or less above finish floor. Concealed outlets and exposed outlets at ceilings shall be installed in pressed galvanized or cadmium plated steel metal boxes, Raco, Steel City,

or Appleton. All fixture outlet boxes shall be mounted to a stud so as to support the weight of the fixture. Floor boxes shall be equal to Walker 800 series with adjustable tops. Duplex fittings for installation on floor boxes shall be equal to Walker 803GC. Contractor shall install weatherproof duplex outlets on the roof at HVAC units to meet the requirements of N.E.C. Article 210 Part 63.

E. Receptacles and cord bodies of the types as shown on the legend shall be installed where shown on the drawings. No convenience receptacle shall be located within 6'0" of a water supply

2.3 GFCI RECEPTACLES

A. General Description:

1. Straight blade, feed-through type.
2. Comply with NEMA WD 1, NEMA WD 6, UL 498, UL 943 Class A, and FS W-C-596.
3. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.

B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:

2.4 PENDANT CORD-CONNECTOR DEVICES

A. Description:

1. Matching, locking-type plug and receptacle body connector.
2. NEMA WD 6 Configurations L5-20P and L5-20R, heavy-duty grade, and FS W-C-596.
3. Body: Nylon, with screw-open, cable-gripping jaws and provision for attaching external cable grip.
4. External Cable Grip: Woven wire-mesh type made of high-strength, galvanized-steel wire strand, matched to cable diameter, and with attachment provision designed for corresponding connector.

2.5 CORD AND PLUG SETS

A. Description:

1. Match voltage and current ratings and number of conductors to requirements of equipment being connected.
2. Cord: Rubber-insulated, stranded-copper conductors, with Type SOW-A jacket; with green-insulated grounding conductor and ampacity of at least 130 percent of the equipment rating.
3. Plug: Nylon body and integral cable-clamping jaws. Match cord and receptacle type for connection.

2.6 TOGGLE SWITCHES

A. Wall switches of the type shown shall be installed to control lighting circuits as shown. Switches shall have white phenolic case and handle and shall be mounted with centerline of outlet at 4'-0' above finished floor unless otherwise shown. Switches, which control loads of 1400 watts or less, shall be Hubbell, #1201, #1202, #1203, or #1204. Switches which control loads greater than the above shall be Hubbell #1221, #1222, #1223, or #1224. Switches in sales area and other finished areas shall be equipped with device plates of .035" thickness satin finish stainless steel 18-8, type 302. All other plates on condulet bodies shall be cadium plated sheet steel.

2.7 WALL PLATES

A. Single and combination types shall match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Material for Finished Spaces: Satin finish Stainless Steel
3. Material for Unfinished Spaces: Galvanized steel.
4. Material for Damp Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in wet and damp locations.

B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, die-cast aluminum with lockable cover.

2.8 FLOOR SERVICE FITTINGS

A. Type: Modular, flush-type, dual-service units suitable for wiring method used.

B. Compartments: Barrier separates power from voice and data communication cabling.

C. Service Plate: Round, with satin finish.

D. Power Receptacle: NEMA WD 6 Configuration 5-20R, gray finish, unless otherwise indicated.

2.9 PREFABRICATED MULTIOUTLET ASSEMBLIES

A. Description:

1. Two-piece surface metal raceway, with factory-wired multioutlet harness.
2. Components shall be products from single manufacturer designed for use as a complete, matching assembly of raceways and receptacles.

B. Raceway Material: Metal, with manufacturer's standard finish.

C. Multioutlet Harness:

1. Receptacles: 15-A, 125-V, NEMA WD 6 Configuration 5-15R receptacles complying with NEMA WD 1, UL 498, and FS W-C-596.
2. Receptacle Spacing: 6 inches.
3. Wiring: No. 12 AWG solid, Type THHN copper, single circuit.

2.10 SERVICE POLES

A. Description:

1. Factory-assembled and -wired units to extend power and voice and data communication from distribution wiring concealed in ceiling to devices or outlets in pole near floor.
2. Poles: Nominal 2.5-inch- square cross section, with height adequate to extend from floor to at least 6 inches above ceiling, and with separate channels for power wiring and voice and data communication cabling.
3. Mounting: Ceiling trim flange with concealed bracing arranged for positive connection to ceiling supports; with pole foot and carpet pad attachment.
4. Finishes: Manufacturer's standard painted finish and trim combination.
5. Wiring: Sized for minimum of five No. 12 AWG power and ground conductors and a minimum of four, four-pair, Category 3 or Category 5 voice and data communication cables.
6. Power Receptacles: Two duplex, 20-A, straight-blade receptacles complying with requirements in this Section.
7. Voice and Data Communication Outlets: Blank insert with bushed cable opening complying with requirements in Section 271500 "Communications Horizontal Cabling."

2.11 WIRE AND CABLE

A. Complete systems of wiring shall be installed as shown on the Drawings and as specified. The Project will use Type THW installed in conduit for feeder and branch circuit wiring. Each raceway indicated by symbol on Drawings shall contain two No. 12 AWG wires unless otherwise noted, scheduled or indicated. Hatch marks on raceway symbols indicate the number of No. 12 AWG conductors when the number exceeds two. Homeruns exceeding 75 feet shall use No. 10 AWG from the panel to the first outlet box. Fixture and equipment connections will be made with Type AF or Type THHN as required for the proper temperature rating. Contractor shall not use ampacity ratings of higher temperature wires to downsize conductors.

B. All conductors shall be copper, 98% conductivity with 600 volt insulation approved for the location and use. Unless otherwise shown on the Drawings, interior conductors #10 AWG and smaller shall be solid and shall have Type "THW" insulation or Type "RHW" insulation. Unless otherwise shown, interior conductors #8 AWG and larger shall be stranded and shall have Type "THW" or Type "RHW" insulation. Fixture leads shall be Type "AF", 300 volt, minimum size #16. Except for signal circuits, remote control circuits and fixtures leads as described above, no wiring shall be smaller than #12 AWG. All joints in wiring shall be made with approved solderless connectors and with

insulating plastic tape that meets or exceeds all national, state, and local electrical codes.

2.12 FINISHES

A. Device Color:

1. Wiring Devices Connected to Normal Power System: white unless otherwise indicated or required by NFPA 70 or device listing.
2. Wiring Devices Connected to Emergency Power System: Red.
3. Clean power (UPS) Receptacles: Orange.

B. Wall Plate Color: Stainless Steel (except clean power, which shall be orange)

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.

B. Coordination with Other Trades:

1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
4. Install wiring devices after all wall preparation, including painting, is complete.

C. Conductors:

1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
4. Existing Conductors:

    a. Cut back and pigtail, or replace all damaged conductors.
    b. Straighten conductors that remain and remove corrosion and foreign matter.

c. Pigtailing existing conductors is permitted, provided the outlet box is large enough.

D. Device Installation:

1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the right.
2. Install hospital-grade receptacles in patient-care areas with the ground pin or neutral blade at the top.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

G. Dimmers:

1. Install dimmers within terms of their listing.
2. Verify that dimmers used for fan speed control are listed for that application.
3. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' device listing conditions in the written instructions.

H. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

I. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

J. Make splices only if absolutely necessary. Make splices in accessible locations. Make splices in conductors No. 10 AWG and smaller with an insulated pressure type connector. Make splices in conductors No. 8 AWG and larger with a solderless connector and cover with an insulation material equivalent to the conductor insulation.

3.2 GFCI RECEPTACLES

A. Install feed-through-type GFCI receptacles where protection of downstream receptacles is required.

3.3 WIRING METHODS

A. Wiring method shall be insulated conductors installed in conduit, except where specifically indicated or specified otherwise, or required by NFPA 70 to be installed otherwise. Conduit shall be rigid metal conduit, intermediate metal conduit (IMC), or electrical metallic tubing (EMT) except where specified or indicated otherwise.

3.4 COVERS AND DEVICE PLATES

A. Install with all four edges in continuous contact with finished wall surfaces without the use of mats or similar devices. Plaster fillings will not be permitted. Plates shall be installed with an alignment of 1/16 inch. The use of sectional type device plates will not be permitted. Plates installed in wet locations shall be gasketed.

3.5 EQUIPMENT CONNECTIONS

A. Provide power wiring for the connection of motors and control equipment under this section of the specification. Except as otherwise specifically noted or specified, automatic control wiring, control devices, and protective devices within the control circuitry are not included in this section of the specification, but shall be provided under Mechanical section. All control wiring for owner furnished refrigeration equipment shall be under this section, and completed by electrical contractor. All motors 5 horsepower and up shall have the electrical connections made up at the motor using split bolt connectors and not wire nuts.

B. SIGNAL BELLS AND BUZZER

1. Provide a system of signal bells as shown on the plans. Bells shall be for operation on 120 volts A.C.; Edwards #340-4N5, or Ellenco #504. No other supplier shall be accepted. The parcel pickup bell system and chime to be furnished by Food Lion and installed by electrical contractor.

2. Provide 24-volt bell for Meat, Deli/Bakery, and/or Produce as shown on plans. Service bell shall be 4" dia. For 24-volt operation; Edwards #340-4G5, color Gray, no alternates accepted. The service bell system will require transformer

rating for 120V AC input voltage and 24V AC push button. Components shall be mounted at locations and elevations as indicated on plans.

C. SIGNS

1. The Electrical Contractor shall wire all store front and Food Lion's portion of parking lot signs. Where Food Lion has a sign in the parking lot, the electrical contractor shall install a 110-volt heavy-duty duplex receptacle in a weatherproof enclosure and cover. This outlet shall be on a separate 20-ampere breaker wired with 20-ampere wire.

D. AUTOMATIC DOOR OPERATORS

1. Furnish electrical system for power supply to automatic door operators. Operators are furnished and installed under another division of these specifications. The Contractor shall provide all necessary outlets, raceways, and conductors required for these door operators and shall leave a complete operating electrical power supply system for these door operators. Electrical characteristics are 115 V.A.C., single phase, 60 Hz, 20 amperes. Provide concealed power supply to header assembly through aluminum doorjambs. Electrical contractor is to provide "on" and "off" switch to be located in doorframe of each door. Provide "trim-line" aluminum plate cover to match door jams in size and color.

E. WATER HEATERS

1. Water heaters and reclaim water heaters (with electric element) are furnished and installed under other divisions of these specifications. See construction documents for the model and manufacturer of all water heaters. Under this division, the contractor shall provide raceways, conductors, and shall make all electrical connections for these heaters. Separate disconnects are to be provided for each water heater. Mount disconnect within easy reach of each water heater as indicated on construction documents.

F. TENANT SUPPLIED EQUIPMENT

1. In addition to other equipment mentioned in other sections of these specifications, all tenant supplied equipment with electrical requirement shall be wired by the electrical contractor unless otherwise specified.

G. GONDOLA

1. The Electrical Contractor shall provide and install all lighting and receptacles as shown on construction documents. Mount all light switches at 4'-0" above finished floor unless otherwise noted. Provide receptacles, light switches, and box covers that match gondola colors. No floor mounted outlets will be accepted.

3.6 IDENTIFICATION

A. Identify each receptacle with panelboard identification and circuit number. Use hot, stamped, or engraved machine printing with black-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

3.7 FIELD QUALITY CONTROL

A. Show by demonstration in service that all circuits and devices are in operating condition. Tests shall be such that each item of control equipment will function not less than five times. All test shall be witnessed by a representative of Food Lion Provide adequate labor and materials to repair any circuit, or device that fails this testing at no expense to the owner or Food Lion.

B. Wiring device will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION 26 27 26

SECTION 26 51 00 - INTERIOR LIGHTING - (NATIONAL ACCOUNT)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Interior lighting fixtures, lamps, LED sources, drivers and traditional source ballasts.
2. Emergency lighting units.
3. Exit signs.
4. Lighting fixture supports.

1.3 DEFINITIONS

A. BF: Ballast factor.

B. CCT: Correlated color temperature.

C. CRI: Color-rendering index.

D. HID: High-intensity discharge.

E. LED: Light Emitting Diode

F. Lumen: Measured output of lamp and luminaire, or both.

G. IESNA LM-79-08: photometric testing standard used for LED luminaires

H. Luminaire: Complete lighting fixture, including ballast or driver housing if provided.

1.4 COORDINATION

A. Coordinate layout and installation of lighting fixtures and suspension system with other construction that penetrates ceilings or is supported by them, including HVAC equipment, fire-suppression system, and partition assemblies.

1.5 WARRANTY

A. Special Warranty for products containing Light Emitting Diode (LED): Manufacturer's agrees to repair or replace components of indoor and outdoor luminaires that fail in materials or workmanship, including LED array and driver for a period of five (5) years from the date of shipment from Manufacturer’s facilities. The LED arrays in the Product(s) will be considered defective in material or workmanship only if a total of 15% or more of the individual light emitting diodes in the Product(s) fail to illuminate.

B. Coordinate quantities of all fixtures with Sylvania, any discrepancy shall be resolved prior to entering order.

C. Special Warranty for Emergency Lighting Batteries: Manufacturer's standard form in which manufacturer of battery-powered emergency lighting unit agrees to repair or replace components of rechargeable batteries that fail in materials or workmanship within specified warranty period.

1. Warranty Period for Emergency Lighting Unit Batteries: Five years from date of Substantial Completion. Full warranty shall apply for first year, and prorated warranty for the remaining nine years.
2. Warranty Period for Emergency Fluorescent Ballast and Self-Powered Exit Sign Batteries: Five years from date of Substantial Completion. Full warranty shall apply for first year, and prorated warranty for the remaining six years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide product indicated on Drawings.

B. On all new Food Lion built and owned stores, Food Lion has a national agreement with Sylvania and SL Bagby. All products are to be provided as specified, and are to be quoted and purchased from Sylvania. For details about purchasing, contact Sylvania National Accounts at 1-800-579-1514. For questions about design or installation, contact SLBagby via email: design@slbagby.com.

C. On all Food Lion remodels, Food Lion has a national agreement with Sylvania and SL Bagby. For details about purchasing, contact Sylvania National Accounts at 1-800-579-1514. For questions about design or installation, contact SL Bagby via email: design@slbagby.com.

D. Any specialty fixture not distributed by Sylvania shall be purchased directly by the Electrical Contractor as noted on drawings.

2.2 GENERAL REQUIREMENTS FOR LIGHTING FIXTURES AND COMPONENTS

A. Recessed Fixtures: Comply with NEMA for ceiling compatibility for recessed fixtures.

B. Metal Parts: Free of burrs and sharp corners and edges.

C. Sheet Metal Components: Steel unless otherwise indicated. Form and support to prevent warping and sagging.

D. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

E. Diffusers and Globes:

1. Acrylic Lighting Diffusers: 100 percent virgin acrylic plastic. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.

    a. Lens Thickness: At least 0.125 inch minimum unless otherwise indicated.
    b. UV stabilized and absorbent.

2. Glass: Annealed crystal glass unless otherwise indicated.

F. Factory-Applied Labels: Comply with UL 1598. Include recommended LED, drivers, lamps and ballasts. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.

1. Label shall include the following lamp and ballast characteristics:

    a. "USE ONLY" and include specific lamp type.
    b. Lamp diameter code (T-4, T-5, T-8, T-12, etc.), tube configuration (twin, quad, triple, etc.), base type, and nominal wattage for fluorescent and compact fluorescent luminaires.
    c. Lamp type, wattage, bulb type (ED17, BD56, etc.) and coating (clear or coated) for HID luminaires.
    d. Start type (preheat, rapid start, instant start, etc.) for fluorescent and compact fluorescent luminaires.
    e. ANSI ballast type (M98, M57, etc.) for HID luminaires.
    f. CCT and CRI for all luminaires.

G. The Contractor shall furnish, assemble, install, connect and lamp fixtures for all lighting outlets as shown in schedule on drawings. Continuous-row fluorescent fixtures shall be supported by the fixture stud in outlet boxes, or fixture units not so supported shall be adequately supported from structural members by means of manufacturer provided mounted systems. Contractor must request mounting systems provided by manufacturer at time of quote and order. All outlet boxes shall be supported from building structure, independent or suspended ceilings. Provide spacer type locking clip support, Lithonia HRC-1 at 4'-0" o.c. for continuous row lighting fluorescent fixtures to be supported from T-runners of suspended ceiling system. Coordinate work with the acoustical section of specifications. All fluorescent fixtures in back room area where there is no suspended ceiling shall be suspended 5'-0" below chord of joists by means of manufacturer supplied mounting systems and mounted at height shown on plans. Contractor must request mounting systems provided by manufacturer at time of quote and order.

2.3 BALLASTS FOR LINEAR FLUORESCENT LAMPS

A. General Requirements for Electronic Ballasts:

1. Comply with UL 935 and with ANSI C82.11.
2. Designed for type and quantity of lamps served.
3. Ballasts shall be designed for full light output unless another BF, dimmer, or bi-level control is indicated.
4. Sound Rating: Class A.
5. Total Harmonic Distortion Rating: Less than 10 percent.
6. Transient Voltage Protection: IEEE C62.41.1 and IEEE C62.41.2, Category A or better.

7. Operating Frequency: 42 kHz or higher.
8. Lamp Current Crest Factor: 1.7 or less.
9. BF: 0.88 or higher.
10. Power Factor: 0.95 or higher.
11. Parallel Lamp Circuits: Multiple lamp ballasts shall comply with ANSI C82.11 and shall be connected to maintain full light output on surviving lamps if one or more lamps fail.

B. Luminaires controlled by occupancy sensors shall have programmed-start ballasts.

C. Electronic Programmed-Start Ballasts for T8 Lamps: Comply with ANSI C82.11 and the following:

1. Lamp end-of-life detection and shutdown circuit for T8 diameter lamps.
2. Automatic lamp starting after lamp replacement.

D. Single Ballasts for Multiple Lighting Fixtures: Factory wired with ballast arrangements and bundled extension wiring to suit final installation conditions without modification or rewiring in the field.

E. Ballasts for Low-Temperature Environments:

1. Temperatures 0 Deg F and Higher: Electronic type rated for 0 deg F starting and operating temperature with indicated lamp types.

2.4 DRIVER FOR LED UNITS

A. General Requirements for Electronic Drivers:

1. Must be UL approved for 120-277 VAC 50-60Hz.
2. Designed to match LED output needed.
3. Driver shall be designed for full light output unless dimmer, or bi-level control is indicated.
4. Sound Rating: Class A.
5. Total Harmonic Distortion Rating at 100% load: Less than 20 percent.
6. Transient Voltage Protection: IEEE C62.41.1 and IEEE C62.41.2, Category A or better.
7. Must comply with ANSI C62.41 (Category A), ANSI C82.11.
8. Must comply with FCC part 15
9. Current: +/- 5% accuracy.
10. Power Factor: 0.90 or higher.
11. Driver shall carry a minimum 5 year warranty.
12. Driver shall be designed for a 50,000 hour life.

B. Drivers for Low-Temperature Environments:

1. Temperatures 0 Deg F and Higher: Electronic type rated for 0 deg F starting and operating temperature with indicated lamp types.

2.5 EMERGENCY FLUORESCENT POWER UNIT

A. Type: Self-contained, modular, battery-inverter unit, factory mounted within lighting

fixture body and compatible with ballast. Comply with UL 924.

1. Emergency Connection: Operate one fluorescent lamp(s) continuously at an output of 1400 lumens each. Connect unswitched circuit to battery-inverter unit and switched circuit to fixture ballast.
2. Nightlight Connection: Operate one fluorescent lamp continuously.
3. Test Push Button and Indicator Light: Visible and accessible without opening fixture or entering ceiling space.

    a. Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
    b. Indicator Light: LED indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.

4. Battery: Sealed, maintenance-free, nickel-cadmium type.
5. Charger: Fully automatic, solid-state, constant-current type with sealed power transfer relay.

2.6 EXIT SIGNS

A. General Requirements for Exit Signs: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.

B. Internally Lighted Signs:

1. Lamps for AC Operation: LEDs, 50,000 hours minimum rated lamp life.

2. Self-Powered Exit Signs (Battery Type): Integral automatic charger in a self-contained power pack.

    a. Battery: Sealed, maintenance-free, nickel-cadmium type.
    b. Charger: Fully automatic, solid-state type with sealed transfer relay.
    c. Operation: Relay automatically energizes lamp from battery when circuit voltage drops to 80 percent of nominal voltage or below. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
    d. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
    e. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.

3. Master/Remote Sign Configurations:

    a. Master Unit: Comply with requirements above for self-powered exit signs, and provide additional capacity in battery for power connection to remote unit.
    b. Remote Unit: Comply with requirements above for self-powered exit signs, except omit power supply, battery, and test features. Arrange to receive full power requirements from master unit. Connect for testing concurrently with master unit as a unified system.

2.7 EMERGENCY LIGHTING UNITS

A. General Requirements for Emergency Lighting Units: Self-contained units complying with UL 924.

1. Battery: Sealed, maintenance-free, nickel-cadmium type.
2. Charger: Fully automatic, solid-state type with sealed transfer relay.
3. Operation: Relay automatically turns lamp on when power-supply circuit voltage drops to 80 percent of nominal voltage or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
4. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
5. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.

2.8 FLUORESCENT LAMPS

A. T8 rapid-start lamps, rated 30W maximum, nominal length of 48 inches, 2700 initial lumens (minimum), CRI 75 (minimum), color temperature 3500 K, and average rated life 42,000 hours unless otherwise indicated.

2.9 LIGHT EMMITTING DIODES

A. Outdoor lighting:

1. LED must meet ANSI C78.377, 2008 at 4000k or 5000K
2. LED lumen maintenance must be tested per IESNA LM-80-08 and projected per IESNA TM-21-11
3. Life rating must be a minimum L88 at 100,000 hours and L92 at 50,000 hours in a 25C environment.

B. Indoor lighting:

1. LED must be within a 2.5 MacAdam ellipse minimum at 3500K
2. LED lumen maintenance must be tested per IESNA LM-80-08 and projected per IESNA TM-21-11
3. Life rating must be a minimum L70 at 100,000 hours and L86 at 60,000 hours in a 30c environment.

2.10 LIGHTING FIXTURE SUPPORT COMPONENTS

A. Comment removed

B. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated steel, 12 gage.

C. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Lighting fixtures:

1. Set level, plumb, and square with ceilings and walls unless otherwise indicated.
2. Install lamps in each luminaire.

B. Temporary Lighting: If it is necessary, and approved by Architect, to use permanent luminaires for temporary lighting, install and energize the minimum number of luminaires necessary. When construction is sufficiently complete, remove the temporary luminaires, disassemble, clean thoroughly, install new lamps, and reinstall.

C. Remote Mounting of Ballasts or Drivers: Distance between the ballast and fixture shall not exceed that recommended by ballast manufacturer. Electrical Contractor must verify, with luminaire, ballast and driver manufacturers, maximum distance between ballast/driver and luminaire.

D. Lay-in Ceiling Lighting Fixtures Supports: Use grid as a support element.

1. Install ceiling support system rods or wires, independent of the ceiling suspension devices, for each fixture. Locate not more than 6 inches from lighting fixture corners.
2. Support Clips: Fasten to lighting fixtures and to ceiling grid members at or near each fixture corner with clips that are UL listed for the application.
3. Fixtures of Sizes Less Than Ceiling Grid: Install as indicated on reflected ceiling plans or center in acoustical panel, and support fixtures independently with at least two 3/4-inch metal channels spanning and secured to ceiling tees.
4. Install at least one independent support rod or wire from structure to a tab on lighting fixture. Wire or rod shall have breaking strength of the weight of fixture at a safety factor of 3.

E. Suspended Lighting Fixture Support:

1. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.
2. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.
3. Continuous Rows: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of fixture chassis, including one at each end.
4. Do not use grid as support for pendant luminaires. Connect support wires or rods to building structure.

F. Connect wiring according to Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables."

3.2 IDENTIFICATION

A. Install labels with panel and circuit numbers on concealed junction and outlet boxes. Comply with requirements for identification specified in Section 26 05 53 "Electrical General Requirements".

3.3 FIELD QUALITY CONTROL

A. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery and retransfer to normal.

B. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to

demonstrate compliance with standards.

END OF SECTION 26 51 00

SECTION 26 56 00 - EXTERIOR LIGHTING - (NATIONAL ACCOUNT)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Exterior luminaires with lamps and drivers.
2. Poles and accessories.

B. Related Sections:

1. Section 26 51 00 "Interior Lighting" for exterior luminaires normally mounted on exterior surfaces of buildings.

1.3 DEFINITIONS

A. CCT: Correlated color temperature.

B. CRI: Color-rendering index.

C. LED: Light Emitting Diode.

D. LER: Luminaire efficacy rating.

E. Luminaire: Complete lighting fixture, including driver housing if provided.

F. Pole: Luminaire support structure, including tower used for large area illumination.

G. Standard: Same definition as "Pole" above.

1.4 QUALITY ASSURANCE

A. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by manufacturers' laboratories that are accredited under the National Volunteer Laboratory Accreditation Program for Energy Efficient Lighting Products.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with IEEE C2, "National Electrical Safety Code."

D. Comply with NFPA 70.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Package aluminum poles for shipping according to ASTM B 660.

B. Store poles on decay-resistant-treated skids at least 12 inches above grade and vegetation. Support poles to prevent distortion and arrange to provide free air circulation.

C. Retain factory-applied pole wrappings on metal poles until right before pole installation. For poles with nonmetallic finishes, handle with web fabric straps.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace products that fail in materials or workmanship; that corrode; or that fade, stain, perforate, erode, or chalk due to effects of weather or solar radiation within specified warranty period. Manufacturer may exclude lightning damage, hail damage, vandalism, abuse, or unauthorized repairs or alterations from special warranty coverage.

1. Warranty Period for Luminaires: Ten years from date of Substantial Completion.
2. Warranty Period for Metal Corrosion: Ten years from date of Substantial Completion.
3. Warranty Period for Color Retention: Ten years from date of Substantial Completion.
4. Warranty Period for Poles: Repair or replace lighting poles and standards that fail in finish, materials, and workmanship within manufacturer's standard warranty period, but not less than three years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: 171/215/223 watt LED. International Dark Sky approved.

B. LED pole mounted fixture manufacturer:

1. CREE Lighting System: model # WLS-OSQ-XX or WLS-OSQ-HO-XX

a. Main parking lighting: WLS-OSQ-L-A-NM-5SH-40K, or WLS-OSQ-HO-XX-40K Finish/Color to be determined.
b. Perimeter parking lighting: WLS-OSQ-L-A-NM-4ME-40K, WLS-OSQ-L-A-NM-3ME-S-40K, or WLS-OSQ-HO-XX-40K Finish/Color to be determined.
c. Wall packs: WLS-XSPW-B-WM-4ME-6L-40K, wall mount fixtures.
d. Flood lights: WLS-EHF-N6-12-700-40K floods with brackets.

C. Poles and brackets shall be:

1. Crouse-Hinds, WHITCO, Security Lighting, K&W, Cree or as specified on plans by Architect/Engineer.

2.2 GENERAL REQUIREMENTS FOR LUMINAIRES

A. Luminaires shall comply with UL 1598 and be listed and labeled for installation in wet locations by an NRTL acceptable to authorities having jurisdiction.

B. Lateral Light Distribution Patterns: Comply with IESNA RP-8 for parameters of lateral light distribution patterns indicated for luminaires.

C. Metal Parts: Free of burrs and sharp corners and edges.

D. Sheet Metal Components: Corrosion-resistant aluminum unless otherwise indicated. Form and support to prevent warping and sagging.

E. Housings: Cast aluminum, weather and light-tight enclosures that will not warp, sag, or deform in use. Provide filter/breather for enclosed luminaires.

F. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during installation, servicing and when secured in operating position.

G. Exposed Hardware Material: Stainless steel.

H. Plastic Parts: High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.

I. Light Shields: Metal baffles, factory installed and field adjustable, arranged to block light distribution to indicated portion of normally illuminated area or field.

J. Reflecting surfaces shall have minimum reflectance as follows unless otherwise indicated:

1. White Surfaces: 85 percent.
2. Specular Surfaces: 83 percent.
3. Diffusing Specular Surfaces: 75 percent.

K. Lenses and Refractors Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.

L. Factory-Applied Finish for Aluminum Luminaires: Comply with NAAMM’s “Metal Finishes Manual for Architectural and Metal Products” for recommendations for applying and designating finishes.

1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

2. Powder coat finish with E-Coat epoxy primer color to be selected from manufacturer’s full range.

M. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps and drivers. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.

1. Label shall include the following lamp and ballast characteristics:

a. "USES ONLY" and include specific lamp type.
b. CCT and CRI for all luminaires.

2.3 LED LAMPS

A. Minimum CRI 70/80, and CCT color temperature 4000 K.

2.4 GENERAL REQUIREMENTS FOR POLES AND SUPPORT COMPONENTS

A. Structural Characteristics: Comply with AASHTO LTS-4-M.

1. Wind-Load Strength of Poles: Adequate at indicated heights above grade without failure, permanent deflection, or whipping in steady winds of speed indicated in "Structural Analysis Criteria for Pole Selection" Article.
2. Strength Analysis: For each pole, multiply the actual equivalent projected area of luminaires and brackets by a factor of 1.1 to obtain the equivalent projected area to be used in pole selection strength analysis.

B. Luminaire Attachment Provisions: Comply with luminaire manufacturers' mounting requirements. Use stainless-steel fasteners and mounting bolts unless otherwise indicated.

C. Mountings, Fasteners, and Appurtenances: Corrosion-resistant items compatible with support components.

1. Materials: Shall not cause galvanic action at contact points.
2. Anchor Bolts, Leveling Nuts, Bolt Caps, and Washers: Hot-dip galvanized after fabrication unless otherwise indicated.
3. Anchor-Bolt Template: Plywood or steel.

D. Hand hole: Minimum clear gasketed opening of 4 by 6 inches, with cover secured by stainless-steel captive screws.

E. Concrete Pole Foundations: Cast in place, with anchor bolts to match pole-base flange. Concrete, reinforcement, and formwork are specified in Section 03 30 00 "Cast-in-Place Concrete."

F. Power-Installed Screw Foundations: Factory fabricated by pole manufacturer, with structural steel complying with ASTM A 36/A 36M and hot-dip galvanized according to ASTM A 123/A 123M; and with top-plate and mounting bolts to match pole base flange and strength required to support pole, luminaire, and accessories.

G. Breakaway Supports: Frangible breakaway supports, tested by an independent testing agency acceptable to authorities having jurisdiction, according to AASHTO LTS-4-M.

2.5 STEEL POLES

A. Poles: Comply with ASTM A 500, Grade B, carbon steel with a minimum yield of 46,000 psig; one-piece construction up to 35 feet in height with access hand hole in pole wall.

1. Shape: Tapered Round or Square (match existing).
2. Mounting Provisions: Butt flange for bolted mounting on foundation or breakaway support.

B. Grounding and Bonding Lugs: Welded 1/2-inch threaded lug listed for attaching grounding and bonding conductors of type and size listed in that Section, and accessible through handhole.

C. Cable Support Grip: Wire-mesh type with rotating attachment eye, sized for diameter of cable rated for a minimum load equal to weight of supported cable times a 5.0 safety factor.

D. Galvanized Finish: After fabrication, hot-dip galvanize complying with ASTM A 123/A 123M.

E. Factory-Painted Finish: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

1. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning," to remove dirt, oil, grease, and other contaminants that could impair paint bond. Grind welds and polish surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or with SSPC-SP 8, "Pickling."
2. Interior Surfaces of Pole: One coat of bituminous paint, or otherwise treat for equal corrosion protection.
3. Exterior Surfaces: Manufacturer's standard finish consisting of one or more coats of primer and two finish coats of high-gloss, high-build polyurethane enamel.

    a. Color: As indicated by manufacturer's designations.

2.6 ALUMINUM POLES

A. Poles: Seamless, extruded structural tube complying with ASTM B 429/B 429M, Alloy 6063-T6 with access handhole in pole wall.

B. Poles: ASTM B 209, 5052-H34 marine sheet alloy with access handhole in pole wall.

1. Shape: Tapered Round or match existing.
2. Mounting Provisions: Butt flange for bolted mounting on foundation or breakaway support.

C. Pole-Top Tenons: Fabricated to support luminaire or luminaires and brackets indicated, and securely fastened to pole top.

D. Grounding and Bonding Lugs: Welded 1/2-inch threaded lug listed for attaching grounding and bonding conductors of type and size listed in that Section, and accessible through hand hole.

E. Brackets for Luminaires: Detachable, with pole and adapter fittings of cast aluminum. Adapter fitting welded to pole and bracket, then bolted together with stainless-steel bolts.

1. Tapered oval cross section, with straight tubular end section to accommodate luminaire.
2. Finish: Same as pole.

F. Aluminum Finish: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
2. As indicated on the drawing.

a. Color: As indicated on the drawing.

2.7 DESIGN REQUIREMENTS

A. Design and layout lighting system in conformance with the following spacing and mounting height parameters.

1. Mounting Heights

a. Parking area luminaire mounting height shall not be more than 35 feet mounted on a 36” high concrete base.
b. Drive or roadway luminaire mounting height shall not be more than 35 feet mounted on a 36” high concrete base.

2. Spacing Requirements

a. Lighting standards shall be installed not over five (5) times the luminaire mounting height apart and not over two and one-half (2½) times the mounting height from the perimeter of the lot. The above spacing and mounting height ratios are to be maintained. Illumination parameters are a supplement to the design and do not supersede spacing to mounting height requirements. Alternate designs necessitated by local requirements or existing co-tenant conditions require approval prior to submission of design.

3. Supplemental Design Parameters

a. Illumination shall be provided based on the following parameters: (I.E.S. recommendations.

1) Foot candle requirements:

a) Six (6) foot candles minimum (not minimum average) maintained for the first 150 feet directly in front of Food Lion.
b) Six (6) foot candles minimum average acceptable in the balance of all paved areas, with a three (3) foot candle minimum (not minimum average).

2) Maximum to minimum ratio shall be 4.5 to 1.
3) LED sources only.
4) Use tallest poles practical and minimum number necessary.
5) Site lighting engineer shall submit to Food Lion a photometric layout for approval.

4. Point By Point

a. Both the original design submittal and the manufacturer's shop drawing submittal shall include a point-by-point computer generated foot-candle spread sheet.
b. This scaled spread sheet shall be in the form of a parking area overlay with calculated points not over 20' on center and the following data printed on same sheet:

1) Store number, center name and location
2) Drawing scale
3) Output data as noted in 2.7–A–3
4) Input data including:

a) Manufacturer's name and location
b) Luminaire data: Catalog number and type
c) Lamp data
d) Mounting heights
e) Luminaire position and orientation

B. New Store Requirements

1. Coordinate with the Food Lion designated engineering firm to develop a photometric for each site.
2. Site plan will be provided by the civil engineering firm.
3. Photometric drawings and any revised drawings must be submitted to Food Lion for approval, any drawings not bearing a Food Lion approved stamp are invalid.
4. Coordinate the installation time frame with a Food Lion Construction Manager, the developer, and the general contractor.
5. The lighting supplier/contractor is responsible for the coordination of all work related to the installation of a complete and acceptable job. Including permits, the cost of a surveyor to properly stake the pole locations and elevations, trenching or horizontal boring for all underground conduits from the designated electrical panel (panel PLL) to the parking lot poles and pylon sign(s). Backfill all trenching to grade using #2 gravel/crush and run. Install all conduit and wire in accordance with the National Electrical Code and make terminations inside electrical panel and poles. Install new bases, poles, and fixtures. Pylon signs require conduit and wire sized as noted on the ES-1 plan, termination is by the sign company.

6. Acceptance of the installation will be made by a Food Lion Construction Manager. Items for acceptance will include a completed form designating the wire size, amperages per circuit and a revised as built drawing if circuits or conduit deviate from the onsite ES-1 drawing. All poles must be labeled with a permanent tag indicating the electrical panel and circuit from where the luminaries are powered.

C. Remodel Scope Of Work And Specifications

1. This scope applies to remodels, renewal markets, takeovers and existing store parking lot lighting upgrades. Furnish and install a complete system including a photometric per Food Lion's lighting specifications, concrete bases, poles, luminaries.
2. Food Lion will request a site evaluation to determine the feasibility of a site lighting upgrade based on existing light levels, lease language, and cost.
3. Food Lion will provide a site plan for the requested location, if a site plan is not available the site lighting contractor should develop a photometric based on data collected during the initial site visit showing existing pole locations, parking area and spaces, additional tenant space, etc.
4. The initial site survey should determine the feasibility for the lighting upgrade based on existing foot-candle readings, where the existing parking poles are powered from, house panel, Food Lion panel, or power company. Probability of the use of the existing locations and integrity of the existing bases. Electrical requirements should also be evaluated to determine if the existing electrical panel loads, capacity, breakers, and wire size are adequate to accommodate additional wattage for the new lighting.
5. Using the information collected during the initial visit a photometric will be submitted to Food Lion to show new and existing pole locations and the proposed light levels compared to the light level readings taken during the initial visit.
6. A cost proposal for the site lighting upgrade is to be submitted with the proposed photometric to determine the feasibility of the lighting upgrade. The cost estimate should include all cost associated with the upgrade including but not limited to the items listed below.

    a. site survey
    b. photometric
    c. landlord contact for site lighting upgrade approval
    d. landlord document submittals, cut sheets, electrical data, etc.
    e. power company contact and coordination if required
    f. locality permits and plan reviews, submittals
    g. All work must be coordinated with the Food Lion Construction Manager and Store Manager and done with discretion as not to discourage store sales.
    h. fixtures, poles, anchor bolts, and hardware
    i. Horizontal boring for electrical conduit, no trenching is allowed on existing sites. Rock is an exception.
    j. Installation of new bases. Asphalt repair around new or existing bases must be backfilled with stone and patched with hot asphalt or concrete, cold patch is not allowed.
    k. Retrofitting of existing bases to accommodate new poles and electrical.

l. Installation of electrical to existing panels or additional panels as required. When possible, power new luminaries from the Food Lion electrical panel. Food Lion and Landlord house panels must be labeled correctly to identify the parking lot lighting circuits.
m. All Food Lion powered parking lot lighting must be controlled by Food Lion's Energy Management control panel. Contact Energy Analyst, ext. 4647, at Food Lion when this programming is complete.
n. Label poles with a permanent label identifying the location of the electrical source, to include panel and circuit number.
o. Complete and submit asbuilt drawings to Food Lion
p. Submitting completion form with circuit location and amperage.
q. On sites where existing bases are painted, the new bases must be painted traffic yellow to match. Do not paint bases otherwise.
r. Removal and disposal of all old fixtures and poles, unless otherwise directed by the landlord.

PART 3 - EXECUTION

3.1 The entire parking lot lighting system shall be connected to the parking lot lighting panel (PLL). The panel shall be supplied and metered by the tenant. It is the responsibility of the engineer to verify said requirements with the developer. The parking lot lighting directly affected by Food Lion operations shall be controlled by the Food Lion energy management control panel.

3.2 Building mounted lighting is not allowed. Contact Food Lion Engineering Department for consideration of exception.

3.3 LUMINAIRE INSTALLATION

A. Install lamps in each luminaire.

B. Fasten luminaire to indicated structural supports.

1. Use fastening methods and materials selected to resist seismic forces defined for the application and approved by manufacturer.

C. Adjust luminaires that require field adjustment or aiming. Include adjustment of photoelectric device to prevent false operation of relay by artificial light sources, favoring a north orientation.

3.4 POLE INSTALLATION

A. Alignment: Align pole foundations and poles for optimum directional alignment of luminaires and their mounting provisions on the pole.

B. Clearances: Maintain the following minimum horizontal distances of poles from surface and underground features unless otherwise indicated on Drawings:

1. Fire Hydrants and Storm Drainage Piping: 60 inches.
2. Water, Gas, Electric, Communication, and Sewer Lines: 10 feet.

3. Trees: 15 feet from tree trunk.

C. Concrete Pole Foundations: Set anchor bolts according to anchor-bolt templates furnished by pole manufacturer. Concrete materials, installation, and finishing requirements are specified in Section 03 30 00 "Cast-in-Place Concrete."

D. Poles and Pole Foundations Set in Concrete Paved Areas: Install poles with minimum of 6-inch- wide, unpaved gap between the pole or pole foundation and the edge of adjacent concrete slab. Fill unpaved ring with pea gravel to a level 1 inch below top of concrete slab.

E. Raise and set poles using web fabric slings (not chain or cable).

3.5 CORROSION PREVENTION

A. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum by insulating fittings or treatment.

B. Steel Conduits: In concrete foundations, wrap conduit with 0.010-inch- thick, pipe-wrapping plastic tape applied with a 50 percent overlap.

3.6 GROUNDING

A. Ground metal poles and support structures according to NEC and grounding details per plans.

1. Install grounding electrode for each pole unless otherwise indicated.
2. Install grounding conductor pigtail in the base for connecting luminaire to grounding system.

B. Ground nonmetallic poles and support structures according to NEC and grounding detail per plans.

1. Install grounding electrode for each pole.
2. Install grounding conductor and conductor protector.
3. Ground metallic components of pole accessories and foundations.

3.7 FIELD QUALITY CONTROL

A. Inspect each installed fixture for damage. Replace damaged fixtures and components.

B. Illumination Observations: Verify normal operation of lighting units after installing luminaires and energizing circuits with normal power source.

1. Verify operation of photoelectric controls.

C. Illumination Tests:

1. Measure light intensities at night. Use photometers with calibration referenced to NIST standards. Comply with the following IESNA testing guide(s):

a. IESNA LM-64, "Photometric Measurements of Parking Areas."
b. IESNA LM-72, "Directional Positioning of Photometric Data."

D. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

END OF SECTION 26 56 00