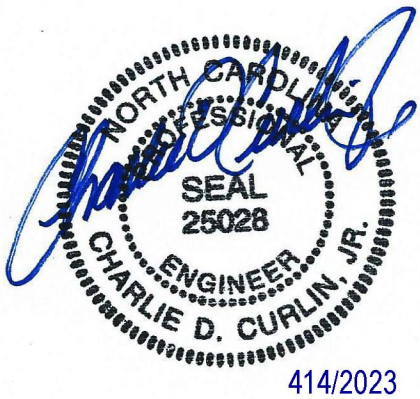
PROJECT MANUAL
FOR

FOOD LION

OF SPRING LAKE, NC

ARCHITECT / ENGINEER
CUHACI PETERSON



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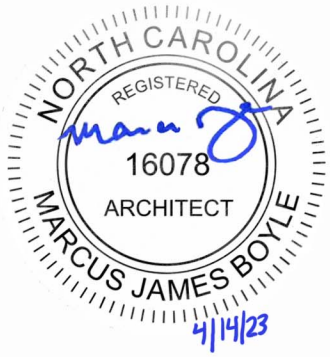
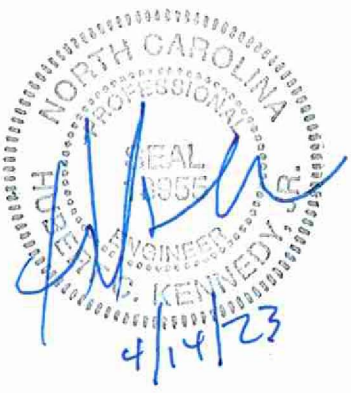


4/14/23



4/14/23

DATE
April 14, 2023

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."

Original Release – 7/22/2015 – Volume 01
Print Date – 7/22/2015

REVISIONS:

9/3/2015 – Volume 02 -- General Revisions
10/1/2015 – Volume 03 -- General Revisions
7/14/2016 – Volume 04 -- General Revisions
2/9/2017 – Volume 05 – General Revisions
5/14/2018 – Volume 06 – General Revisions
3/7/2019 – Volume 07 – General Revisions
12/4/2019 – Volume 08 – General Revisions

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END OF SECTION

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

FORM OF AGREEMENT

FORM OF AGREEMENT

1.01 The agreement will be the Food Lion standard agreement as indicated below:

PIN #: _____

Contract #: _____ - _____ - _____

Project: _____, ____

CONSTRUCTION CONTRACT

THIS CONSTRUCTION CONTRACT is made and entered into as of _____, 20____, ("Effective Date") by and between **FOOD LION, LLC**, a North Carolina limited liability company [or **HANNAFORD BROS. CO.,** a Maine corporation] (hereinafter called "**Owner**"), and _____, a _____ [Insert full name of Contractor and type of entity (corporation or limited liability company) with state of incorporation] (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 _____ [Insert brief description of Contractor's portion of the project, or indicate that Contractor is responsible for the entire project] (the "Project"), located at _____, _____, _____ [Insert street address with town/city and 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 _____ ($_____).

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 _____, 20____.
- The "Scheduled Substantial Completion Date" shall be _____, 20____.
- 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. Food Lion 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 Food Lion, 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 Food Lion.

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 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. Contractor shall pay all federal, state sales, and use taxes (or similar levies) on all materials, tools, and equipment furnished under this Contract, and upon request shall submit evidence to Owner that all such tax payments have been made.

2.1.6. 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.

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. 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.

5.3. 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. 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, 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) five percent (5%) 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; and

(j) 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 Contractor's services, including without limitation any breach of contract or negligent act or omission of (i) Contractor, (ii) Contractor's Subcontractors, or (iii) the agents, employees or servants of Contractor or its Subcontractors.

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.

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:
[Insert Opco name from page 1]

_____
Witness

By: _____
Print Name: _____
Print Title: _____

Owner's Address:
2110 Executive Drive
P.O. Box 1330
Salisbury, NC 28145-1330
Attn: Store Development
145 Pleasant Hill Road
Scarborough, Maine 04074
Attn: Store Development
(if by overnight courier)
or
P. O. Box 1000
Portland, Maine 04104-5005
Attn: Store Development
(if by U.S. Postal Service)

Owner's Representative:
[Insert name and title]
Food Lion

Office: _____
Mobile: _____
Fax: _____
E-mail: _____

CONTRACTOR:
_____

_____
Witness

By: _____
Print Name: _____
Print Title: _____

Contractor's Address:

Contractor's Representative:
_____
Office: _____
Mobile: _____
Fax: _____
E-mail: _____

Contractor's License #: _____

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.

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

2. Supplemental General Conditions: None. [Note: supplemental conditions will govern over our standard Contract terms, and typically are not included. If applicable, identify with specificity after careful review]

3. Scope of Work: [identify with specificity or state None]

4. Drawings and Specifications: [identify with specificity or state None]

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 Damage**: $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:

[Name of Owner entity], 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.

END OF SECTION 00 50 00

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: _____
ADDRESS: _____
CONTACT: _____
PHONE: _____

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

AUTOMATIC DOORS: _____
ADDRESS: _____
CONTACT: _____
PHONE: _____

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

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

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

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

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

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

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

UTILITY COMPANIES THAT WILL PROVIDE PERMANENT SERVICE TO THIS STORE:

ELECTRICAL: _____
ADDRESS: _____
PHONE: _____
ACCOUNT #: _____

GAS: _____
CONTACT: _____
PHONE: _____

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

WATER: _____
ADDRESS: _____
CONTACT: _____
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. Immediately 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 nonattacking. 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 were 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	$\leq$ 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 03 41 00 - PRECAST STRUCTURAL CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes precast structural concrete.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Design Mixtures: For each precast concrete mixture.

C. Shop Drawings:

1. Include member locations, plans, elevations, dimensions, shapes and sections, openings, support conditions, and types of reinforcement, including special reinforcement.
2. Detail fabrication and installation of precast structural concrete units, including connections at member ends and to adjoining construction.

D. Delegated-Design Submittal: For precast structural concrete indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

E. Color samples: Three samples for each type of finish, illustrating the full range of color and texture variations expected.

1. Submit 12”x12”x 2” panels to the Owner.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer, fabricator, testing agency.

1. Provide specific information on at least five successful precast concrete projects of comparable size and scope completed by the installer and fabricator.

B. Welding certificates.

C. Material certificates.

D. Material Test Reports: For aggregates.

E. Source quality-control reports.

F. Field quality-control and special inspection reports.

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: A firm that assumes responsibility for engineering precast structural concrete units to comply with performance requirements. Responsibility includes preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.

1. Designated as a certified plant by one of the following:

a. PCI Group CA, Category C3A - Precast Concrete Products.
b. NCPA designation

B. Quality-Control Standard: For manufacturing procedures, testing requirements, and quality-control recommendations for types of units required, comply with PCI MNL 116, "Manual for Quality Control for Plants and Production of Structural Precast Concrete Products."

1. Include compression strength and water-absorption tests.

C. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.4/D1.4M, "Structural Welding Code - Reinforcing Steel."

1.5 COORDINATION

A. Furnish loose connection hardware and anchorage items to be embedded in or attached to other construction before starting that Work. Provide locations, setting diagrams, templates, instructions, and directions, as required, for installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer.

B. Design Standards: Comply with ACI 318 (ACI 318M) and with design recommendations in PCI MNL 120, "PCI Design Handbook - Precast and Prestressed Concrete," applicable to types of precast structural concrete units indicated.

C. Structural Performance: Precast structural concrete units and connections shall withstand design loads indicated within limits and under conditions indicated.

2.2 REINFORCING MATERIALS

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

B. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.

C. Steel Bar Mats: ASTM A 184/A 184M, fabricated from ASTM A 615/A 615M, Grade 60 (Grade 420), deformed bars, assembled with clips.

D. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, fabricated from as-drawn steel wire into flat sheets.

E. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M or ASTM A 1064/A 1064M, flat sheet.

F. Supports: Suspend reinforcement from back of mold or use bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place according to PCI MNL 116.

2.3 PRESTRESSING TENDONS

A. Strand: ASTM A 416/A 416M, Grade 270 (Grade 1860), uncoated, seven-wire, low-relaxation strand.

2.4 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150/C 150M, Type I or Type III, gray, unless otherwise indicated.

B. Supplementary Cementitious Materials:

1. Metakaolin: ASTM C 618, Class N.
2. Silica Fume: ASTM C 1240, with optional chemical and physical requirement.
3. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
4. Fly ash admixture: ASTM C 618, Class C or F.

C. Normal-Weight Aggregates: Except as modified by PCI MNL 116, ASTM C 33/C 33M, with coarse aggregates complying with Class 4M. Stockpile fine and coarse aggregates for each type of exposed finish from a single source (pit or quarry) for Project.

D. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete and complying with chemical limits of PCI MNL 116.

E. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.

F. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and to not contain calcium chloride, or more than 0.15 percent chloride ions or other salts by weight of admixture.

2.5 STEEL CONNECTION MATERIALS

A. Carbon-Steel Shapes and Plates: ASTM A 36/A 36M.

B. Carbon-Steel-Headed Studs: ASTM A 108, Grade 1010 through 1020, cold finished, AWS D1.1/D1.1M, Type A or B, with arc shields and with minimum mechanical properties of PCI MNL 116.

C. Carbon-Steel Plate: ASTM A 283/A 283M, Grade C.

D. Malleable-Iron Castings: ASTM A 47/A 47M, Grade 32510 or Grade 35028.

E. Carbon-Steel Castings: ASTM A 27/A 27M, Grade 60-30 (Grade 415-205).

F. High-Strength, Low-Alloy Structural Steel: ASTM A 572/A 572M.

G. Carbon-Steel Structural Tubing: ASTM A 500/A 500M, Grade B or Grade C.

H. Wrought Carbon-Steel Bars: ASTM A 675/A 675M, Grade 65 (Grade 450).

I. Deformed-Steel Wire or Bar Anchors: ASTM A 496/A 496M or ASTM A 706/A 706M.

J. Carbon-Steel Bolts and Studs: ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); carbon-steel, hex-head bolts and studs; carbon-steel nuts, ASTM A 563 (ASTM A 563M); and flat, unhardened steel washers, ASTM F 844.

K. Zinc-Coated Finish: For exterior steel items, steel in exterior walls, and items indicated for galvanizing, apply zinc coating by hot-dip process according to ASTM A 123/A 123M or ASTM A 153/A 153M.

2.6 BEARING PADS

A. Provide bearing pads for precast structural concrete units as recommended by precast fabricator for application.

2.7 GROUT MATERIALS

A. Sand-Cement Grout: Portland cement, ASTM C 150/C 150M, Type I, and clean, natural sand, ASTM C 144 or ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 to 3 parts sand, by volume, with minimum water required for placement and hydration. Water-soluble chloride ion content less than 0.06 percent by weight of cement when tested according to ASTM C 1218/C 1218M.

B. Nonmetallic, Nonshrink Grout: Packaged, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, plasticizing and water-reducing agents, complying with ASTM C 1107/C 1107M, Grade A for drypack and Grades B and C for flowable grout and of consistency suitable for application within a 30-minute working time. Water-soluble chloride ion content less than 0.06 percent by weight of cement when tested according to ASTM C 1218/C 1218M.

C. Epoxy-Resin Grout: Two-component, mineral-filled epoxy resin; ASTM C 881/C 881M, of type, grade, and class to suit requirements.

2.8 INSULATED FLAT-WALL PANEL ACCESSORIES

A. Molded-Polystyrene Board Insulation: ASTM C 578, Type II, 1.35 lb/cu. ft. (22 kg/cu. m); ship-lap edges. R-24 min.

B. Extruded-Polystyrene Board Insulation: ASTM C 578, Type X, 1.30 lb/cu. ft. (21 kg/cu. m); ship-lap edges; R-24 min.

C. Polyisocyanurate Board Insulation: ASTM C 591, Type I, 1.8 lb/cu. ft. (29 kg/cu. m) unfaced, R-24 min.

D. Wythe Connectors: to be selected from the following by the precast fabricator: Glass-fiber-reinforced vinylester connectors; Polypropylene pin connectors; Stainless-steel pin connectors; Bent galvanized reinforcing bars; Galvanized welded wire trusses; Galvanized bent wire connectors; Epoxy-coated carbon-fiber grid; Fiberglass trusses; manufactured to connect wythes of precast concrete panels.

2.9 CONCRETE MIXTURES

A. Prepare design mixtures for each type of precast concrete required.

1. Limit use of fly ash to 25 percent replacement of portland cement by weight and ground granulated blast-furnace slag to 40 percent of portland cement by weight; metakaolin and silica fume to 10 percent of portland cement by weight.

B. Design mixtures may be prepared by a qualified independent testing agency or by qualified precast plant personnel at precast structural concrete fabricator's option.

C. Limit water-soluble chloride ions to maximum percentage by weight of cement permitted by ACI 318 (ACI 318M) or PCI MNL 116 when tested according to ASTM C 1218/C 1218M.

D. Normal-Weight Concrete Mixtures: Proportion face and backup mixtures or full-depth mixtures, at fabricator's option by either laboratory trial batch or field test data methods according to ACI 211.1, with materials to be used on Project, to provide normal-weight concrete with the following properties:

1. Compressive Strength (28 Days): 5000 psi (34.5 MPa).
2. Maximum Water-Cementitious Materials Ratio: 0.45.

E. Water Absorption: Limit water absorption to 6 percent by weight or 14 percent by volume, tested according to ASTM C 642, except for boiling requirement.

F. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content complying with PCI MNL 116.

G. When included in design mixtures, add other admixtures to concrete mixtures according to manufacturer's written instructions.

H. Concrete Mix Adjustments: Concrete mix design adjustments may be proposed if characteristics of materials, Project conditions, weather, test results, or other circumstances warrant.

2.10 FABRICATION

A. Cast-in Anchors, Inserts, Plates, Angles, and Other Anchorage Hardware: Fabricate anchorage hardware with sufficient anchorage and embedment to comply with design requirements. Accurately position for attachment of loose hardware, and secure in place during precasting operations. Locate anchorage hardware where it does not affect position of main reinforcement or concrete placement.

1. Weld-headed studs and deformed bar anchors used for anchorage according to AWS D1.1/D1.1M and AWS C5.4, "Recommended Practices for Stud Welding."

B. Furnish loose hardware items including steel plates, clip angles, seat angles, anchors, dowels, cramps, hangers, and other hardware shapes for securing precast structural concrete units to supporting and adjacent construction.

C. Cast-in reglets, slots, holes, and other accessories in precast structural concrete units as indicated on the Contract Drawings.

D. Cast-in openings larger than 12 inches in any dimension. Do not drill or cut openings or prestressing strand without Architect's approval.

E. Reinforcement: Comply with recommendations in PCI MNL 116 for fabricating, placing, and supporting reinforcement.

F. Reinforce precast structural concrete units to resist handling, transportation, and erection stresses and specified in-place loads.

G. Prestress tendons for precast structural concrete units by either pretensioning or post-tensioning methods. Comply with PCI MNL 116.

H. Comply with requirements in PCI MNL 116 and in this Section for measuring, mixing, transporting, and placing concrete. After concrete batching, no additional water may be added.

I. Place concrete in a continuous operation to prevent cold joints or planes of weakness from forming in precast concrete units.

J. Thoroughly consolidate placed concrete by vibration without dislocating or damaging reinforcement and built-in items, and minimize pour lines, honeycombing, or entrapped air voids on surfaces. Use equipment and procedures complying with PCI MNL 116.

K. Comply with PCI MNL 116 procedures for hot- and cold-weather concrete placement.

L. Identify pickup points of precast structural concrete units and orientation in structure with permanent markings, complying with markings indicated on Shop Drawings. Imprint or permanently mark casting date on each precast structural concrete unit on a surface that does not show in finished structure.

M. Cure concrete, according to requirements in PCI MNL 116, by moisture retention without heat or by accelerated heat curing using live steam or radiant heat and moisture. Cure units until compressive strength is high enough to ensure that stripping does not have an effect on performance or appearance of final product. During cold weather, maintain units above freezing until specified compressive strength is reached.

N. Discard and replace precast structural concrete units that do not comply with requirements, including structural, manufacturing tolerance, and appearance, unless repairs meet requirements in PCI MNL 116 and meet Architect's approval.

2.11 CASTING INSULATED WALL PANELS

A. Cast, screed, and consolidate wythe supported by mold.

B. Place insulation boards abutting edges and ends of adjacent boards. Insert wythe connectors through insulation, and consolidate concrete around connectors according to connector manufacturer's written instructions.

C. Cast, screed, and consolidate top wythe to meet required finish.

2.12 FABRICATION TOLERANCES

A. Fabricate precast structural concrete units to shapes, lines, and dimensions indicated so each finished unit complies with PCI MNL 116 product dimension tolerances as well as position tolerances for cast-in items.

2.13 COMMERCIAL FINISHES

A. Commercial Grade (Interior face): Remove fins and protrusions larger than 1/8 inch (3 mm) and fill holes larger than 1/2 inch (13 mm). Rub or grind ragged edges. Faces must have true, well-defined surfaces. Air holes, water marks, and color variations are permitted. Limit form joint offsets to 3/16 inch (5 mm).

B. Grade B Finish (Exterior face) : Fill air pockets and holes larger than 1/4 inch (6 mm) in diameter with sand-cement paste matching color of adjacent surfaces. Fill air holes greater than 1/8 inch (3 mm) in width that occur more than once per 2 sq. in. (1300 sq. mm). Grind smooth form offsets or fins larger than 1/8 inch (3 mm). Repair surface blemishes due to holes or dents in molds. Discoloration at form joints is permitted.

1. Exterior form liner to replicate a standard “split-face” CMU.

C. Screed or float finish unformed surfaces. Strike off and consolidate concrete with vibrating screeds to a uniform finish. Hand screed at projections. Normal color variations, minor indentations, minor chips, and spalls are permitted. Major imperfections, honeycombing, or defects are not permitted.

2.14 SOURCE QUALITY CONTROL

A. Testing: Test and inspect precast structural concrete according to PCI MNL 116 requirements and ASTM C 1610/C 1610M, ASTM C 1611/C 1611M, ASTM C 1621/C 1621M, and ASTM C 1712/C 1712M.

B. Defective Units: Discard and replace precast structural concrete units that do not comply with requirements, including strength, manufacturing tolerances, and color and texture range. Chipped, spalled, or cracked units may be repaired, subject to Architect's approval.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install clips, hangers, bearing pads, and other accessories required for connecting precast structural concrete units to supporting members and backup materials.

B. Erect precast structural concrete level, plumb, and square within specified allowable tolerances. Provide temporary structural framing, shoring, and bracing as required to maintain position, stability, and alignment of units until permanent connections are complete.

1. Maintain horizontal and vertical joint alignment and uniform joint width as erection progresses.
2. Unless otherwise indicated, provide uniform joint widths of ¾”.

3. Remove projecting lifting devices and use plastic patch caps or sand-cement grout to fill voids within recessed lifting devices flush with surface of adjacent precast surfaces when recess is exposed.

C. Connect precast structural concrete units in position by bolting, welding, grouting, or as otherwise indicated on Shop Drawings. Remove temporary shims, wedges, and spacers as soon as practical after connecting and grouting are completed.

D. Field cutting of precast units is not permitted without approval of Architect.

E. Fasteners: Do not use drilled or powder-actuated fasteners for attaching accessory items to precast, prestressed concrete units.

F. Welding: Comply with applicable requirements in AWS D1.1/D1.1M and AWS D1.4/D1.4M for welding, welding electrodes, appearance, quality of welds, and methods used in correcting welding work.

G. At bolted connections, use lock washers, tack welding, or other approved means to prevent loosening of nuts after final adjustment.

H. Grouting or Dry-Packing Connections and Joints: Grout connections and joints and open spaces at keyways, connections, and joints where required or indicated on Shop Drawings. Retain flowable grout in place until hard enough to support itself. Alternatively, pack spaces with stiff dry-pack grout material, tamping until voids are completely filled.

3.2 ERECTION TOLERANCES

A. Erect precast structural concrete units level, plumb, square, and in alignment without exceeding the noncumulative erection tolerances of PCI MNL 135.

B. Minimize variations between adjacent slab members by jacking, loading, or other method recommended by fabricator and approved by Architect.

3.3 FIELD QUALITY CONTROL

A. Special Inspections: Engage a qualified special inspector to perform the following special inspections:

1. Erection of precast structural concrete members.
2. Material Certification.
3. Mixing of Grout.
4. Grouting Installation.
5. Grout strength.

B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

C. Coordinate special inspections with the Owner.

D. Visually inspect field welds and test according to ASTM E 165 or to ASTM E 709 and ASTM E 1444. High-strength bolted connections are subject to inspections.

E. Testing agency will report test results promptly and in writing to Owner, Contractor, and Architect.

F. Repair or remove and replace work where tests and inspections indicate that it does not comply with specified requirements.

G. Additional testing and inspecting, at Contractor's expense, shall be performed to determine compliance of replaced or additional work with specified requirements.

H. Prepare test and inspection reports.

3.4 REPAIRS

A. Repair precast structural concrete units if permitted by Owner.

1. Repairs required due to handling and erection may be permitted if structural adequacy, serviceability, durability, and appearance of units have not been impaired.

2. Repairs required due to fabrication shall take place at the fabricator’s plant.

B. Mix patching materials and repair units so cured patches blend with color, texture, and uniformity of adjacent exposed surfaces and show no apparent line of demarcation between original and repaired work, when viewed in typical daylight illumination from a distance of 20 feet (6 m).

C. Prepare and repair damaged galvanized coatings with galvanizing repair paint according to ASTM A 780/A 780M.

D. Wire brush, clean, and paint damaged prime-painted components with same type of shop primer.

E. Remove and replace damaged precast structural concrete units that cannot be repaired or when repairs do not comply with requirements as determined by Architect.

3.5 CLEANING

A. Clean mortar, plaster, fireproofing, weld slag, and other deleterious material from concrete surfaces and adjacent materials immediately.

B. Clean exposed surfaces of precast concrete units after erection and completion of joint treatment to remove weld marks, other markings, dirt, and stains.

1. Perform cleaning procedures, if necessary, according to precast concrete fabricator's written recommendations. Protect other work from staining or damage due to cleaning operations.
2. Do not use cleaning materials or processes that could change the appearance of exposed concrete finishes or damage adjacent materials.

END OF SECTION 03 41 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 04 73 23 - CALCIUM SILICATE MANUFACTURED BUILDING STONE MASONRY

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Calcium silicate building stone units.

1.2 RELATED SECTIONS

A. Section 05 50 00 "Metal Fabrications" for furnishing steel lintels and shelf angles for unit masonry.

B. Section 07 62 00 "Sheet Metal Flashing and Trim" for furnishing manufactured reglets installed in masonry joints.

1.3 REFERENCES

A. TMS 602/ACI 530.1/ASCE 6, Specifications for Masonry Structures.

1.4 TEST REPORTS

A. Test Reports: test results prepared by an independent testing agency, indicating tested material characteristics as part of a source quality control program, current within the past five (5) years.

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.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver calcium silicate building stone units in protective film. Prevent damage to units.

B. Lift skids with proper and sufficiently long slings or forks with protection to prevent damage to units. Protect edges and corners.

C. Store units in a manner designed to prevent damage and staining of units.

D. Stack units on timbers or platforms at least 3 inches above grade.

E. Place polyethylene or other plastic film between wood and other finished surfaces of units when stored for extended periods of time.

F. Cover stored units with protective enclosure if exposed to weather.

G. Do not use salt or calcium-chloride to remove ice from masonry surfaces.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Conform to requirements of ACI 530.1/ASCE 6/TMS 602, Specifications for Masonry Structures, PART 1.8.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers of calcium silicate building stone units having Products considered acceptable for use:

1. Arriscraft International

B. Substitution Procedures: No substitutions allowed

2.2 MATERIALS

A. Calcium Silicate Building Stone Units: to ASTM C73, Grade SW; solid units that have been pressure formed and autoclaved; special shapes as indicated; -size configuration as follows:

1. Modular Sizes:

a. CIT23: 2-3/8" high, 3-5/8" bed, random lengths.
b. CIT36: 3-13/16" high, 3-5/8" bed, random lengths.
c. CIT52: 5-1/4" high, 3-1/2" bed, random lengths.
d. CIT81: 8-1/8" high, 3-1/2" bed, random lengths.

2. Texture: tumbled finish on exposed faces [and ends];

3. Color: MOCHA
4. Product and Manufacturer's Name: Citadel® Building Stone by Arriscraft International.

B. Mortar: 1:1:6 Portland cement-hydrated lime-sand mix, as specified in Section 042000

C. Grout: maximum 6,500 psi at 28 days, as specified in Section 042000

D. Wall Ties and Anchorages: as specified in Section 042000

E. Joint Sealants and Backer Rods: non-staining type, as specified in Section 079200.

F. Flashing, Vents, and Masonry Accessories: as specified in Section 076200.

2.3 FABRICATION TOLERANCES

A. Fabricate calcium silicate building stone units to a tolerance of plus or minus 1/8".

2.4 SOURCE QUALITY CONTROL

A. Test compressive strength and absorption from specimens selected at random from plant production.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify site conditions are ready to receive work.

B. Inspect materials for fit and finish prior to installation. Do not set unacceptable units.

C. Beginning of installation means acceptance of existing conditions.

3.2 CUTTING MASONRY UNITS

A. Cut masonry units to length with a masonry splitter.

B. Dress split end to match face when exposed in wall.

3.3 WETTING MASONRY UNITS

A. Where the ambient air temperature exceeds 100°F or exceeds 90°F with a wind velocity greater than 8 mph, pre-wet building stone units.

B. Lay wetted units when surface dry.

3.4 COURSING

A. Place masonry to lines and levels indicated.

B. Maintain masonry courses to uniform width. Make vertical and horizontal joints equal and of uniform thickness

C. Lay building stone units in random bond pattern, to the following percentage ratio, described from smallest to largest sized units: 20:20:40:20.

D. Maintain mortar joint thickness of 1/2 inch.

E. Tool joints by compacting the surface when thumbprint hard, to a concave finish.

3.5 PLACING AND BONDING

A. Lay masonry in full bed of mortar, properly jointed with other work. Buttering corners of joints, and deep or excessive furrowing of mortar joints are not permitted.

B. Fully bond intersections, and external corners.

C. Do not adjust masonry units after laying. Where resetting of masonry is required, remove, clean units, and reset in new mortar.

D. Install lintels as scheduled.

E. Install wall ties and anchorages as specified in Section 042000.

F. Install flashings, vents, and masonry accessories as specified in Section 042000

G. Construct movement joints as specified in Section 042000.

3.6 SITE TOLERANCES

A. Erect masonry within the tolerances described in TMS 602/ACI 530.1/ASCE 6, Specifications for Masonry Structures, PART 3.3G.

3.7 FIELD QUALITY CONTROL

A. Food Lion Representative Inspection: Representative will inspect installed masonry and reject masonry that is chipped, cracked, or blemished (streaked, stained or otherwise damaged), as described below.
   1. Masonry will be inspected to be free of cracks or other blemishes on the finished face or front edges of the masonry units exceeding 3/8 inch or that can be seen from a distance of 10 feet.
   2. Units shall exhibit a texture approximately equal to the approved sample when viewed under diffused daylight illumination at a 20-foot distance.
   3. Minor chipping resulting from shipment and delivery shall not be grounds for rejection. Minor chips shall not be obvious under diffused daylight illumination from a 20-foot distance.
   4. Efflorescence will not be cause for rejection.

3.8 PROTECTION

A. Protect units from damage resulting from subsequent construction operations.

B. Use protection materials and methods which will not stain or damage units.

C. Remove protection materials upon Substantial Completion, or when risk of damage is no longer present.

END OF SECTION 04 73 23

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 fabricator 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, no asphaltic, 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 embedment's 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 embedment for compliance with requirements.

1. Prepare a certified survey of bearing surfaces, anchor rods, bearing plates, and other embedment 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 Long span Steel Joists, LH-Series and Deep Long span 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 not 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. Marino WARE.
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-gauge (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 tracks 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 to 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 to 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 damp proofing.

1.2 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by damp proofing manufacturer and has satisfactorily applied the type of damp proofing 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 damp proofing manufacturer for intended use and compatible with bituminous damp proofing.

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, damp proofing application, cure time between coats, and drying time before backfilling unless more stringent requirements are indicated.

1. Apply damp proofing 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 damp proofing 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 damp proofing 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 were shown as "reinforced," by embedding an 8-inch- wide strip of asphalt-coated glass fabric in a heavy coat of damp proofing. Damp proofing coat for embedding fabric is in addition to other coats required.

C. Where damp proofing exterior face of inner wythe of exterior masonry cavity walls, lap damp proofing at least 1/4 inch onto flashing, masonry reinforcement, veneer ties, and other items that penetrate inner wythe.

1. Extend damp proofing over outer face of structural members and concrete slabs that interrupt inner wythe.
2. Lap damp proofing 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. Unpurged 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 damp proofing. Comply with damp proofing-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 Products P.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 were 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 073113 - ASPHALT SHINGLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Asphalt shingles.
2. Underlayment.

1.2 CLOSEOUT SUBMITTALS

A. Maintenance data submitted to Owner.

1.3 WARRANTY

A. Special Warranty: Standard form in which manufacturer agrees to repair or replace asphalt shingles that fail in materials or workmanship within 12 year warranty period.

1. Material Warranty Period: 40 years from date of Substantial Completion, prorated, with first five years non-prorated.
2. Algae-Discoloration Warranty Period: Asphalt shingles will not discolor five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GLASS-FIBER-REINFORCED ASPHALT SHINGLES

A. Laminated-Strip Asphalt Shingles: ASTM D 3462, laminated, multi-ply overlay construction, glass-fiber reinforced, mineral-granule surfaced, and self-sealing.

1. Subject to compliance with requirements, provide product indicated on Drawings and by the following:

a. CertainTeed Corporation - Keith Sheehy (704) 941-4550 (Keith.W.Sheehy@saint-gobain.com)

2. Butt Edge: Straight cut.
3. Strip Size: Manufacturer's standard.
4. Algae Resistance: Granules treated to resist algae discoloration.
5. Color and Blends: As selected by Architect from manufacturer's full range.

B. Hip and Ridge Shingles: Manufacturer's standard units to match asphalt shingles.

2.2 UNDERLAYMENT MATERIALS

A. Self-Adhering Sheet Underlayment, Polyethylene Faced: ASTM D 1970, minimum of 40-mil- thick, slip-resisting, polyethylene-film-reinforced top surface laminated to SBS-modified asphalt adhesive, with release paper backing; cold applied.

2.3 RIDGE VENTS

A. Rigid Ridge Vent: Manufacturer's standard, rigid section high-density polypropylene or other UV-stabilized plastic ridge vent with external deflector baffles; for use under ridge shingles.

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. GAF Materials Corporation.
b. Owens Corning.
c. Trimline Building Products.

2.4 ACCESSORIES

A. Asphalt Roofing Cement: ASTM D 4586, Type II, asbestos free.

B. Roofing Nails: ASTM F 1667; aluminum, stainless-steel, copper, or hot-dip galvanized-steel wire shingle nails, minimum 0.120-inch- diameter, barbed shank, sharp-pointed, with a minimum 3/8-inch- diameter flat head and of sufficient length to penetrate 3/4 inch into solid wood decking or extend at least 1/8 inch through OSB or plywood sheathing.

1. Where nails are in contact with metal flashing, use nails made from same metal as flashing.

C. Felt Underlayment Nails: Aluminum, stainless-steel, or hot-dip galvanized-steel wire with low-profile capped heads or disc caps, 1-inch minimum diameter.

2.5 METAL FLASHING AND TRIM

A. General: Comply with requirements in Section 076200 "Sheet Metal Flashing and Trim."

1. Sheet Metal: Stainless steel.

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

PART 3 - EXECUTION

3.1 UNDERLAYMENT INSTALLATION

A. General: Comply with underlayment manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.

B. Self-Adhering Sheet Underlayment: Install, wrinkle free, on roof deck. Comply with low-temperature installation restrictions of underlayment manufacturer if applicable. Install at locations indicated on Drawings, lapped in direction to shed water. Lap sides not less than 3-1/2 inches. Lap ends not less than 6 inches staggered 24 inches between courses. Roll laps with roller. Cover underlayment within seven days.

3.2 METAL FLASHING INSTALLATION

A. General: Install metal flashings and other sheet metal to comply with requirements in Section 076200 "Sheet Metal Flashing and Trim."

1. Install metal flashings according to recommendations in ARMA's "Residential Asphalt Roofing Manual" and asphalt shingle recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."

3.3 ASPHALT SHINGLE INSTALLATION

A. General: Install asphalt shingles according to manufacturer's written instructions, recommendations in ARMA's "Residential Asphalt Roofing Manual," and asphalt shingle recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."

B. Install starter strip along lowest roof edge, consisting of an asphalt shingle strip at least 7 inches wide with self-sealing strip face up at roof edge.

1. Extend asphalt shingles 1/2 inch over fasciae at eaves and rakes.
2. Install starter strip along rake edge.

C. Install first and remaining courses of asphalt shingles stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure.

D. Install asphalt shingles by single-strip column or racking method, maintaining uniform exposure. Install full-length first course followed by cut second course, repeating alternating pattern in succeeding courses.

E. Fasten asphalt shingle strips with a minimum of four roofing nails located according to manufacturer's written instructions.
   1. Where roof slope is less than 4:12, seal asphalt shingles with asphalt roofing cement spots.
   2. When ambient temperature during installation is below 50 deg F, seal asphalt shingles with asphalt roofing cement spots.

F. Closed-Cut Valleys: Extend asphalt shingle strips from one side of valley 12 inches beyond center of valley. Use one-piece shingle strips without joints in valley. Fasten with extra nail in upper end of shingle. Install asphalt shingle courses from other side of valley and cut back to a straight line 2 inches short of valley centerline. Trim upper concealed corners of cut-back shingle strips.

G. Ridge Vents: Install continuous ridge vents over asphalt shingles according to manufacturer's written instructions. Fasten with roofing nails of sufficient length to penetrate sheathing.

H. Ridge and Hip Cap Shingles: Maintain same exposure of cap shingles as roofing shingle exposure. Lap cap shingles at ridges to shed water away from direction of prevailing winds. Fasten with roofing nails of sufficient length to penetrate sheathing.

   1. Fasten ridge cap asphalt shingles to cover ridge vent without obstructing airflow.

END OF SECTION 07 31 13

SECTION 074113 - STANDING-SEAM METAL ROOF PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes standing-seam metal roof panels.

B. Preinstallation Conference: Conduct conference at Project site.

C. New and Remodel Conditions

1.2 ACTION SUBMITTALS

A. Samples: For each type of metal panel indicated if the product deviates from specifications

1.3 CONTRACT CLOSEOUT SUBMITTALS

A. Special Project Warranty: Provide specified warranty for the Project, executed by the authorized agent of the Manufacturer.

B. Roofing Maintenance Instructions. Provide a manual of manufacturer's recommendations for maintenance of installed roofing systems.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an Installer who has completed the Manufacturer's Approved Roofing Contractor course and is currently certified for the installation of this roof system.

B. Source Limitations: Obtain all components of roof system from a single manufacturer, including roll goods materials if required. Secondary products that are required shall be recommended and approved in writing by the roofing system Manufacture.

1.5 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. Verify available warranties and warranty periods for metal panels.
2. Warranty Period: Two years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
1. 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.

C. Special Weather tightness Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that fail to remain weather tight, including leaks, within specified warranty period.
1. Warranty Period: 20 years non-prorated from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Design metal roof panel assembly, including, comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
1. Uniform Wind Uplift Load Capacity: Installed roof system shall withstand negative wind uplift pressures complying with project structural loading requirements.
2. Identify roof area negative uplift pressure for zones of roof areas and clip spacing permitted for each roof zone. Capacity shall be determined using defined method in accordance with ASTM E 1592, testing of sheet metal roof panels.

B. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 1646: Static pressure water infiltration (roof panels): No evidence of water penetration at an inward static air pressure differential of not less than 6.24 psf and not more than 12.0 psf.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental

effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

2.2 STANDING-SEAM METAL ROOF PANELS

A. General: Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weather tight installation.

B. ACCEPTABLE MANUFACTURERS

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Metal Roofing Systems, Inc. – Gavin Seale (704) 820-3110 (gavin@metalroofingsystems.biz)
   b. Berridge Manufacturing Company – Orion Daniel (704) 363-9897 (oriond08@gmail.com)
   c. Firestone Metal Products, LLC. - Troy Kennedy (704) 302-5774 (tkennedy@acsfirestone.com)
2. Metallic-Coated Steel Sheet: Aluminum-zinc alloy-coated steel sheet complying with ASTM A 792/A 792M, Class AZ55 coating designation; structural quality. Pre-painted by the coil-coating process to comply with ASTM A 755/A 755M.
   a. Nominal Thickness: 24 ga.
   b. Exterior Finish: Nominal 1.0 mil, two-coat fluoropolymer.
   c. Color: As specified on the drawings.
3. Clips: 18 gauge nominal thickness, zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet.
4. Joint Type: Vertical double lock standing rib as per manufacturer's standard.
5. Panel Coverage: 16 inches.
6. Panel Height: 1.75 inches.

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. Thermal Stability: Stable after testing at 240 deg F; ASTM D 1970.
2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F; ASTM D 1970.

3. 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.; Grace Ice and Water Shield HT.

2.4 MISCELLANEOUS MATERIALS

A. Miscellaneous Metal Sub-framing and Furring: ASTM C 645; cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 coating designation or ASTM A 792/A 792M, Class AZ50 coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.

B. Panel Accessories: Provide components required for a complete, weather tight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, metal closure, and similar items. Match material and finish of metal panels unless otherwise indicated.
   1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal panels.
   2. Backing Plates: Provide metal backing plates at panel and end splices, fabricated from material recommended by manufacturer.
   3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weather tight construction.

C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.

D. Gutters and Downspouts: Formed from same material as roof panels according to SMACNA's "Architectural Sheet Metal Manual." Finish to match metal roof panels.

E. Panel Clip Fasteners: Self-tapping screws designed to withstand design loads.

F. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are non-staining, and do not damage panel finish.
   1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray Butyl sealant tape with release-paper backing; 3/4 inch wide and 1/8 inch thick.
   2. Panel Seam Sealant: ASTM D 987; Thermally applied Butyl sealant as recommended in writing by metal panel manufacturer.

3. Tube Sealant; Non-curing Butyl sealant such as Titebond WeatherMaster Metal Roof Sealants, or equal. Color as selected from manufacturer’s standards.

2.5 FABRICATION

A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Provide panel profile, including striations, for full length of panel.

C. Fabricate metal panel joints with factory-installed seam sealant that provide a weather tight seal as to meet Weathertightness Warranty requirements.

D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

2.6 FINISHES

A. Panels and Accessories:
1. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat.
2. Concealed Finish: White or light-colored acrylic or polyester backer finish.

PART 3 - EXECUTION

3.1 PREPARATION

A. Miscellaneous Supports: Install sub-framing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.

3.2 UNDERLAYMENT INSTALLATION

A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply at locations indicated on Drawings, wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side

edges not less than 3-1/2 inches. Extend underlayment into gutter trough. Roll laps with roller. Cover underlayment within 14 days.

1. Apply over the entire roof surface.

B. Flashings: Install flashings to cover underlayment to comply with requirements specified in Section 076200 "Sheet Metal Flashing and Trim."

3.3 METAL PANEL INSTALLATION

A. Standing-Seam Metal Roof Panel Installation: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended in writing by manufacturer engineering.

1. Install clips to supports with self-tapping fasteners.
2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
3. Watertight Installation:
    a. Apply a continuous ribbon of sealant or tape to seal joints of metal panels, using sealant or tape as recommend in writing by manufacturer as needed to make panels watertight.
    b. Provide sealant or tape between panels and protruding equipment, vents, and accessories.

B. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

C. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

3.4 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

3.5 REPAINTING EXISTING STANDING SEAM METAL ROOFING (remodels only)

A. Kynar or other factory finished Standing Seam Metal Roof surfaces:

1. Water-Based Light Industrial Coating System:
    a. Primer: Spot Prime Bare and rusted areas, anti-corrosive for metal: S-W 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, low sheen: SW Bond-Plex, Water-based Acrylic Coating, B71-200 Series, 2.0-4.0 mils dry, to full opacity.

B. Previously Field Painted Standing Seam Metal Roof Surfaces:
1. Water-Based Light Industrial Coating System:
    a. Primer: Spot Prime Bare and rusted areas, anti-corrosive for metal: S-W 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, eggshell: S-W Pro Industrial Multi-Surface Acrylic B66-560 Series, at 1.5 to 2.0 mils dry, per coat apply to full opacity

C. Point of Contact
1. Russ Hansen, CSI, IIDA, The Sherwin-Williams Company (980) 207-9410
    a. Sherwin-Williams Representative can be available for Pre-Construction Meeting upon request.
    b. Sherwin-Williams Representative shall inspect prep work prior to final paint application.

END OF SECTION 07 41 13

SECTION 074646 - FIBER-CEMENT SIDING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes fiber-cement siding and soffit.

1.2 CLOSEOUT DOCUMENTS

A. Maintenance data delivered to Owner.

1.3 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace products that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. James Hardie Building Products Inc., 26300 La Alameda Suite 400; Mission Viejo, CA; 1-866-274-3464; info@jameshardie.com

2.2 FIBER-CEMENT LAP SIDING

A. General: ASTM C 1186, Type A, Grade II, fiber-cement board, noncombustible when tested according to ASTM E 136; with a flame-spread index of 25 or less when tested according to ASTM E 84.

B. Labeling: Provide fiber-cement siding that is tested and labeled according to ASTM C 1186 by a qualified testing agency acceptable to authorities having jurisdiction.

C. Nominal Thickness: Not less than 5/16 inch unless noted otherwise on drawings.

D. Horizontal Pattern: Boards 7-1/4 to 7-1/2 inches wide in plain style unless noted otherwise on drawings.

1. Texture: Smooth unless noted otherwise on drawings.

E. Factory Priming: Manufacturer's standard acrylic primer.

2.3 FIBER-CEMENT SOFFIT PANELS

A. General: ASTM C 1186, Type A, Grade II, fiber-cement board, noncombustible when tested according to ASTM E 136; with a flame-spread index of 25 or less when tested according to ASTM E 84.

B. Nominal Thickness: Not less than 5/16 inch unless noted otherwise on drawings.

C. Pattern: 48-inch-wide sheets with smooth texture unless noted otherwise on drawings.

D. Factory Priming: Manufacturer's standard acrylic primer.

2.4 ACCESSORIES

A. Siding Accessories, General: Provide starter strips, edge trim, outside and inside corner caps, and other items as recommended by siding manufacturer for building configuration.

B. Flashing: Provide stainless-steel flashing complying with Section 076200 "Sheet Metal Flashing and Trim" at window and door heads and where indicated.

C. Fasteners:
1. #8 X 1-5/8 – 2-1/4 Fiber Cement Board Screw, Stainless Steel, Flat Head, Square Drive,

D. Insect Screening for Soffit Vents: Aluminum, 18-by-16 mesh.

E. Continuous Soffit Vents: Aluminum, hat-channel shape.

1. Net-Free Area: 6 sq. in./linear ft.
2. Finish: Mill finish.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Comply with manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.

1. Install fasteners no more than 24 inches o.c.

B. Install joint sealants as specified in Section 079200 "Joint Sealants" and to produce a weather tight installation.

3.2 ADJUSTING AND CLEANING

A. Remove damaged, improperly installed, or otherwise defective materials and replace with new materials complying with specified requirements.

B. Clean finished surfaces according to manufacturer's written instructions and maintain in a clean condition during construction.

END OF SECTION 07 46 46

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 i

C. 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, 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

C. 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 cannot 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 can't 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 sealants 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 were 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. Post installed 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. post installed 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 post installed expansion anchors.

    a. Floor anchors may be set with power-actuated fasteners instead of post installed 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 post installed 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 08 33 23 - OVERHEAD COILING DOORS – (NATIONAL ACCOUNT)

PART 1 - GENERAL

1.1 SUMMARY

A. This item is a National Account for Food Lion

B. Section Includes:
   1. Insulated service doors.

C. Related Requirements:
   1. Section 055000 "Metal Fabrications" for miscellaneous steel supports.

1.2 CLOSEOUT SUBMITTALS

A. Maintenance data submit to Owner.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance, Exterior Doors: Capable of withstanding the design wind loads.
   1. Design Wind Load: Uniform pressure (velocity pressure) of 20 lbf/sq. ft., acting inward and outward.
   2. Testing: According to ASTM E 330.
   3. Large-Missile Test: For overhead coiling doors located within 30 feet of grade.

B. Seismic Performance: Overhead coiling doors shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

2.2 DOOR ASSEMBLY <Insert drawing designation>

A. Insulated Service Door: Overhead coiling door formed with curtain of interlocking metal slats.
   1. Manufacturers: Subject to compliance with requirements, provide products by the following:
      a. Overhead Door Corporation. Series 625 – Devin Mooney (469) 549-7025 (devin_mooney@overheaddoor.com)

B. Operation Cycles: Door components and operators capable of operating for not less than 20,000.

C. Curtain R-Value: R7.7

D. Door Curtain Material: Galvanized steel 0.035 inches - 22 ga.

E. Door Curtain Slats: Flat profile slats of 3-1/4-inch center-to-center height.
   1. Insulated-Slat Interior Facing: Metal.

F. Bottom Bar: Two angles, each not less than 1-1/2 by 1-1/2 by 1/8 inch thick; fabricated from hot-dip galvanized steel and finished.

G. Curtain Jamb Guides: Galvanized steel with exposed finish matching curtain slats. – Minimum 3/16” thick steel angles.

H. Hood: Match curtain material and finish Galvanized steel.
   1. Mounting: Face of wall.

I. Locking Devices: Equip door with chain lock keeper.

J. Manual Door Operator: Chain-hoist operator.

K. Curtain Accessories: Equip door with weather seals pull-down strap.

L. Door Finish:
   1. Baked-Enamel: Color as shown on drawings.
   2. Interior Curtain-Slat Facing: Match finish of exterior curtain-slat face.

2.3 DOOR CURTAIN MATERIALS AND CONSTRUCTION

A. Door Curtains: Fabricate overhead coiling-door curtain of interlocking metal slats, designed to withstand wind loading indicated, in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:
   1. Insulation: Fill slats for insulated doors with manufacturer's standard thermal insulation complying with maximum flame-spread and smoke-developed indexes

of 75 and 450, respectively, according to ASTM E 84 or UL 723. Enclose insulation completely within slat faces.

2. Metal Interior Curtain-Slat Facing: Match metal of exterior curtain-slat face, with minimum steel thickness of 0.016 inch – 30 ga.

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

2.4 HOODS

A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.

2.5 LOCKING DEVICES

A. Chain Lock Keeper: Suitable for padlock.

2.6 CURTAIN ACCESSORIES

A. Weather seals for Exterior Doors: Equip each exterior door with weather-stripping gaskets fitted to entire exterior perimeter of door for a weather-resistant installation unless otherwise indicated.

B. Pull-Down Strap: Provide pull-down straps for doors more than 84 inches high.

2.7 COUNTERBALANCING MECHANISM

A. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.

B. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

2.8 MANUAL DOOR OPERATORS

A. General: Equip door with manual door operator by door manufacturer.

B. Chain-Hoist Operator: Consisting of endless steel hand chain, chain-pocket wheel and guard, and gear-reduction unit with a maximum 30-lbf force for door operation. Provide alloy-steel hand chain with chain holder secured to operator guide.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install overhead coiling doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.

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

3.2 DEMONSTRATION

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

END OF SECTION 08 33 23

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exterior and interior storefront framing.
2. Storefront framing for window walls.
3. Storefront framing for punched openings.

B. Related Sections:

1. 08 42 29 Sliding Automatic Entrances

1.2 SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include plans, elevations, sections, full-size details, and attachments to other work to be reviewed and approved by the general contractor.

1. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.

C. Delegated-Design Submittal: For aluminum-framed entrances and storefronts indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.3 INFORMATIONAL SUBMITTALS

A. Sample warranties.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.6 WARRANTY

A. Special Warranty: Installer agrees to repair or replace components of aluminum-framed entrances and storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period. Manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer to design aluminum-framed entrances and storefronts.

B. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.

1. Aluminum-framed entrances and storefronts shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
2. Failure also includes the following:

a. Thermal stresses transferring to building structure.
b. Glass breakage.
c. Noise or vibration created by wind and thermal and structural movements.
d. Loosening or weakening of fasteners, attachments, and other components.

C. Structural Loads:

1. Wind Loads: As indicated on Drawings. All stores located within 30 miles from the coast shall be designed as hurricane rated system.
2. Other Design Loads: As indicated on Drawings.

D. Energy Performance: Certify and label energy performance according to NFRC as follows:

1. Thermal Transmittance (U-factor): Fixed glazing and framing areas shall have U-factor of not more than 0.45 Btu/sq. ft. x h x deg F as determined according to NFRC 100.

2. Solar Heat Gain Coefficient: Fixed glazing and framing areas shall have a solar heat gain coefficient of no greater than 0.35 as determined according to NFRC 200.
3. Condensation Resistance: Fixed glazing and framing areas shall have an NFRC-certified condensation resistance rating of no less than 15 as determined according to NFRC 500.

E. Windborne-Debris Impact Resistance: Pass missile-impact and cyclic-pressure tests when tested according to ASTM E 1886 and testing information in ASTM E 1996 for Wind Zone where the store is being constructed

1. Large-Missile Test: For glazed openings located within 30 feet of grade.

F. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Kawneer North America. Trifab 451-T with thermal break.
2. YKK AP America Inc.
3. Oldcastle BuildingEnvelope (Vistawall)

2.3 FRAMING

A. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.

1. Construction: Thermally broken.
2. Glazing System: Retained mechanically with gaskets on four sides.
3. Glazing Plane: Front.
4. Finish: Clear anodic finish unless otherwise indicated on the drawings.
5. Fabrication Method: Field-fabricated stick system.

B. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.

C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

D. Materials:

1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

    a. Sheet and Plate: ASTM B 209.
    b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
    c. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.
    d. Structural Profiles: ASTM B 308/B 308M.

2. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.

    a. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
    b. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
    c. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

2.4 GLAZING

A. Glazing: Comply with Section 088000 "Glazing."

B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.

C. Glazing Sealants: As recommended by manufacturer.

2.5 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Physical and thermal isolation of glazing from framing members.
4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
5. Provisions for field replacement of glazing from exterior.
6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

E. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.

F. Entrance Doors: Reinforce doors as required for installing entrance door hardware.

G. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.

H. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings. Coordinate with 087100 Door Hardware.

2.6 ALUMINUM FINISHES

A. Clear Anodic Finish (unless noted otherwise on the drawings): AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints to produce hairline joints free of burrs and distortion.
4. Rigidly secure nonmovement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
6. Seal perimeter and other joints watertight unless otherwise indicated.

B. Metal Protection:

1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Set continuous sill members and flashing in full sealant bed as specified in Section 079200 "Joint Sealants" to produce weathertight installation.

D. Install components plumb and true in alignment with established lines and grades.

E. Install operable units' level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.

F. Install glazing as specified in Section 088000 "Glazing."

END OF SECTION 08 41 13

SECTION 08 42 29.23 - SLIDING AUTOMATIC ENTRANCES – (NATIONAL ACCOUNT)

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes exterior and interior, sliding, power-operated automatic entrances.

B. This is a national account item.

1.2 INFORMATIONAL SUBMITTALS

A. Sample warranties.

1.3 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.4 QUALITY ASSURANCE

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

1.5 WARRANTY

A. Special Warranty: Manufacturer and/or the manufacturer’s distributer agrees to repair or replace, at no additional cost to the owner or tenant, components including doors, track, carriers, operators, controls, etc. and the installation of automatic entrances that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Three (3) years from date of grand opening, or three full years from installation date for all remodel/expansion stores

2. Manufacturer and/or distributer shall have available on a local area level any parts and services required throughout the life of this equipment. All service work shall be performed than an AAADM certified technician.

PART 2 - PRODUCTS

2.1 AUTOMATIC ENTRANCE ASSEMBLIES

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. Power-Operated Door Standard: BHMA A156.10.

2.2 PERFORMANCE REQUIREMENTS

A. Wind Loads: as indicated on the structural drawings.

B. Windborne-Debris Impact Resistance: Automatic entrances shall pass required missile impact and cyclic-pressure tests of ASTM E 1996 according to the IBC for the Wind Zone where the store is being constructed. All stores within 30 miles of the coast shall be designed as hurricane/impact system.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

D. Air Infiltration: Maximum air leakage through fixed glazing and framing areas of 1.25 cfm/sq. ft. of fixed entrance-system area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 1.57 lbf/sq. ft.

2.3 SLIDING AUTOMATIC ENTRANCES

A. General: Provide manufacturer's standard automatic entrances including doors, sidelites, framing, headers, carrier assemblies, roller tracks, door operators, controls, and accessories required for a complete installation.

B. Sliding Automatic Entrance:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Biparting-Sliding Units:

1) Assa-Abloy/Besam –Carolyn Brown (866) 640-9667 ext. 120 (Carolyn.Brown@assaabloy.com)

2. Configuration: Biparting-sliding door(s) with transom and pocketed sidelite(s).

    a. Traffic Pattern: Two way.
    b. Emergency Breakaway Capability: Sliding leaves and sidelite.
    c. Mounting: Between jambs.

3. Operator Features:

    a. Power opening and closing.
    b. Drive System: Chain or belt.
    c. Adjustable opening and closing speeds.
    d. Adjustable hold-open time between zero and 30 seconds.
    e. Obstruction recycle.
    f. On-off/hold-open switch to control electric power to operator, key operated.

4. Sliding-Door Carrier Assemblies and Overhead Roller Tracks: Carrier assembly that allows vertical adjustment; consisting of nylon- or delrin-covered, ball-bearing-center steel wheels operating on a continuous roller track, or ball-bearing-center steel wheels operating on a nylon- or delrin-covered, continuous roller track. Support doors from carrier assembly by cantilever and pivot assembly.

    a. Rollers: Minimum of two ball-bearing roller wheels and two antirise rollers for each active leaf.

5. Sliding-Door Threshold: Threshold members and bottom-guide-track system with stainless-steel, ball-bearing-center roller wheels.

    a. Configuration: Saddle-type threshold across door opening and surface-mounted guide-track system at sidelites.
    b. Threshold shall match thickness of the floor finish as shown on the drawings.

6. Controls: Activation and safety devices according to BHMA standards.

    a. Activation Device: Motion sensor mounted on each side of door header to detect pedestrians in activating zone to activate door operator.
    b. Safety Device: Presence sensor mounted on each side of door header and two photoelectric beams mounted in sidelite jambs on one side of the door to detect pedestrians in presence zone and to prevent door from closing.
    c. Sidelite Safety Device: Presence sensor, mounted above each sidelite on side of door opening through which doors travel, to detect obstructions and to prevent door from opening.

7. Finish: Finish framing, door(s), and header with Class I, clear anodic finish Class I.

a. Color: Clear anodic finish unless noted otherwise on the drawings.

2.4 ENTRANCE COMPONENTS

A. Framing Members: Extruded aluminum, minimum 0.125 inch thick and reinforced as required to support imposed loads.

1. Nominal Size: 1-3/4 by 4-1/2 inches.
2. Extruded Glazing Stops and Applied Trim: Minimum 0.062-inch wall thickness.

B. Stile and Rail Doors: 1-3/4-inch- thick, glazed doors with minimum 0.125-inch- thick, extruded-aluminum tubular stile and rail members. Mechanically fasten corners with reinforcing brackets that are welded or incorporate concealed tie-rods that span full length of top and bottom rails.

1. Glazing Stops and Gaskets: Snap-on, extruded-aluminum stops, and preformed gaskets.
2. Stile Design: Narrow stile, 2 1/8-inch nominal width.

C. Sidelite(s) and Transom: 1-3/4-inch- deep sidelite(s) and transom with minimum 0.125-inch- thick, extruded-aluminum tubular stile and rail members matching door design.

1. Glazing Stops and Gaskets: Same materials and design as for stile and rail door.

D. Headers: Fabricated from minimum 0.125-inch- thick extruded aluminum and extending full width of automatic entrance units to conceal door operators and controls. Provide hinged or removable access panels for service and adjustment of door operators and controls. Secure panels to prevent unauthorized access.

1. Mounting: Concealed, with one side of header flush with framing.

E. Signage: As required by cited BHMA standard.

1. Application Process: Door manufacturer's standard process.

2.5 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

1. Extrusions: ASTM B 221.
2. Sheet: ASTM B 209.

B. Steel Reinforcement: Reinforcement with corrosion-resistant primer complying with SSPC-PS Guide No. 12.00 applied immediately after surface preparation and

pretreatment. Use surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.

C. Stainless-Steel Bars: ASTM A 276 or ASTM A 666, Type 304.

D. Stainless-Steel Tubing: ASTM A 554, Grade MT 304.

E. Expanded Aluminum Mesh: Expanded aluminum sheet according to the geometry of ASTM F 1267.

F. Glazing: As specified in Section 088000 "Glazing."

G. Sealants and Joint Fillers: As specified in Section 079200 "Joint Sealants."

H. Nonmetallic, Shrinkage-Resistant Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout; complying with ASTM C 1107/C 1107M; of consistency suitable for application.

I. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

J. Fasteners and Accessories: Corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

2.6 DOOR OPERATORS AND CONTROLS

A. General: Provide operators and controls, which include activation and safety devices, according to BHMA standards, for condition of exposure, and for long-term, maintenance-free operation under normal traffic load for type of occupancy indicated.

B. Door Operators: Provide door operators of size recommended by manufacturer for door size, weight, and movement.

1. Door Operator Performance: Door operators shall open and close doors and maintain them in fully closed position when subjected to Project's design wind loads.
2. Electromechanical Operators: Concealed, self-contained, overhead unit powered by fractional-horsepower, permanent-magnet dc motor; with closing speed controlled mechanically by gear train and dynamically by braking action of electric motor; with solid-state microprocessor controller; UL 325; and with manual operation with power off.

C. Motion Sensors: Self-contained, K-band-frequency, microwave-scanner units; fully enclosed by its plastic housing; adjustable to provide detection-field sizes and functions required by BHMA A156.10.

1. Provide capability for switching between bidirectional and unidirectional detection.

2. For one-way traffic, sensor on egress side shall not be active when doors are fully closed.

D. Presence Sensors: Self-contained, active-infrared scanner units; adjustable to provide detection-field sizes and functions required by BHMA A156.10. Sensors shall remain active at all times.

E. Photoelectric Beams: Pulsed infrared, sender-receiver assembly for recessed mounting. Beams shall not be active when doors are fully closed.

F. Electrical Interlocks: Unless units are equipped with self-protecting devices or circuits, provide electrical interlocks to prevent activation of operator when door is locked, latched, or bolted.

2.7 HARDWARE

A. General: Provide units in sizes and types recommended by automatic entrance and hardware manufacturers for entrances and uses indicated. Finish exposed parts to match door finish.

B. Breakaway Device for Power-Operated Doors: Device that allows door to swing out in direction of egress to full 90 degrees from any operating position. Interrupt powered operation of door operator while in breakaway mode.

C. Deadlocks: Deadbolt operated by exterior cylinder and interior thumb turn, with minimum 1-inch- long throw bolt; BHMA A156.5, Grade 1.

1. Cylinders: BHMA A156.5, Grade 1, six-pin mortise type.

a. Keying: Integrate into building master key system.

2. Deadbolts: Laminated-steel hook, mortise type, BHMA A156.5, Grade 1.
3. Two-Point Locking for Stile and Rail Sliding Doors: Mechanism in stile of active door leaf that automatically extends second lockbolt into header.

D. Weather Stripping: Replaceable components.

1. Sliding Type: AAMA 701, made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.

2.8 FABRICATION

A. General: Factory fabricate automatic entrance components to designs, sizes, and thicknesses indicated and to comply with indicated standards.

B. Framing: Provide automatic entrances as prefabricated assemblies. Complete fabrication, assembly, finishing, hardware application, and other work before shipment to Project site.

1. Provide components with concealed fasteners and anchor and connection devices.
2. Fabricate components with accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion.
3. Fabricate exterior components to drain condensation and water passing joints within system to the exterior.
4. Provide anchorage and alignment brackets for concealed support of assembly from building structure.
5. Allow for thermal expansion of exterior units.

C. Doors: Factory fabricated and assembled in profiles indicated. Reinforce as required to support imposed loads and for installing hardware.

D. Door Operators: Factory fabricated and installed in headers, including adjusting and testing.

E. Glazing: Fabricate framing with minimum glazing edge clearances for thickness and type of glazing indicated, according to GANA's "Glazing Manual."

F. Hardware: Factory install hardware to greatest extent possible; remove only as required for final finishing operation and for delivery to and installation at Project site. Cut, drill, and tap for factory-installed hardware before applying finishes.

1. Provide sliding-type weather stripping, mortised into door, at perimeter of doors and breakaway sidelites.

G. Controls:

1. General: Factory install activation and safety devices in doors and headers as required by BHMA A156.10 for type of door and direction of travel.

2.9 ALUMINUM FINISHES

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

B. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install automatic entrances according to manufacturer's written instructions and cited BHMA standard for direction of pedestrian travel, including signage, controls, wiring, and connection to the building's power supply.

1. Do not install damaged components. Fit frame joints to produce hairline joints free of burrs and distortion. Rigidly secure nonmovement joints. Seal joints watertight.
2. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.
3. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous coating.

B. Entrances: Install automatic entrances plumb and true in alignment with established lines and grades without warp or rack of framing members and doors. Anchor securely in place.

1. Install surface-mounted hardware using concealed fasteners to greatest extent possible.
2. Set headers, carrier assemblies, tracks, operating brackets, and guides level and true to location with anchorage for permanent support.
3. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within system to exterior.
4. Level recesses for recessed thresholds using nonshrink grout.

C. Door Operators: Connect door operators to electrical power distribution system.

D. Controls: Install and adjust activation and safety devices according to manufacturer's written instructions and cited BHMA standard for direction of pedestrian travel. Connect control wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

E. Glazing: Install glazing as specified in Section 088000 "Glazing." Glazing including opaque panels shall be installed by the glazing contractor.

F. Sealants: Comply with requirements specified in Section 079200 "Joint Sealants" to provide weathertight installation.

1. Set thresholds, framing members and flashings in full sealant bed.
2. Seal perimeter of framing members with sealant.

G. Signage: Apply signage on both sides of each door and breakaway sidelite as required by cited BHMA standard for direction of pedestrian travel.

H. Wiring within Automatic Entrance Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's written limitations on bending radii. Provide and use lacing bars and distribution spools.

3.2 ADJUSTING

A. Adjust hardware, moving parts, door operators, and controls to function smoothly, and lubricate as recommended by manufacturer; comply with requirements of applicable BHMA standards.

B. Readjust door operators and controls after repeated operation of completed installation equivalent to three days' use by normal traffic (100 to 300 cycles).

3.3 DEMONSTRATION

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

END OF SECTION 08 42 29.23

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 latch bolt throw.
2. Mortise Locks: Minimum 3/4-inch latch bolt 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 wheelchair 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 wheelchair 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”

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, counterplaying, 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 were called out on drawings or as directed by Food Lion's Construction Manager. Emulsion type sealer

that dries to glass clear films. 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 Underlayment 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: polyprotic.
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 scratch 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 top coating 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 Kennesaw, 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 13 - 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: “E.g.-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 oxide / 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, e.g.-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. Topcoat: 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 Water based Epoxy Eg-shell, K45 Series.
c. Topcoat: Pro Industrial Pre-Catalyzed Water based Epoxy Eg-shell, K45 Series.

F. Cotton or Canvas and ASJ Insulation-Covering Substrates: Including pipe and duct coverings.

1. Latex System:

a. Prime Coat: DTM Primer/Finish, B66W1.
b. Topcoat Coat: DTM Primer/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. Topcoat: 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 Water based Epoxy Eg-shell, K45 Series.
c. Topcoat: Pro Industrial Pre-Catalyzed Water based Epoxy Eg-shell, K45 Series.

F. Cotton or Canvas and ASJ Insulation-Covering Substrates: Including pipe and duct coverings.

1. Latex System:

a. Topcoat: DTM Primer/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 sandpaper. Fill any holes, cracks or imperfections with a wood filler or latex based caulk.
b. Prime Coat (use natural bristle or nylon/polyester brush; 1/4"-1/2" nap synthetic or mohair roller): Shellac Primer, BA9W8050.
c. Surface Prep: Lightly sand previously primed surface using fine grit sandpaper.
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. Under lavatory 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 warranty.

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: “Thin Air” 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 11 13 00 - LOADING DOCK EQUIPMENT – (NATIONAL ACCOUNT)

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Loading dock bumpers.
2. Loading dock Seals
    a. Foam-pad dock seals.
3. Loading Dock Station Equipment
    a. Recessed dock levelers.

PART 2 - PRODUCTS

2.1 DOCK BUMPERS

A. General: Surface-mounted bumpers; of type, size, and construction indicated; designed to absorb kinetic energy and minimize damage to loading dock structure.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product by the following: McGuire Model # B910-14, 9”

B. Laminated-Tread Dock Bumper: Fabricated from multiple, uniformly thick plies cut from fabric-reinforced rubber tires.

1. Thickness: 9 inches.

C. Materials: ASTM 36/A 36M for steel plates, shapes, and bars. Hot-dip galvanize according to ASTM A 123/A 123M.

2.2 FOAM-PAD DOCK SEALS

A. General: Dock seals consisting of fabric-covered foam pads designed to compress 4 to 5 inches under pressure of truck body.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
    a. McGuire; a division of Systems, Inc. TS121 Series

B. Stationary Head Pad: 24 inches high and same depth as jamb pads; beveled; sized for opening width.

C. Jamb Pads: Beveled; tapered to reduce opening width.

1. Nominal Size: 12 inches wide and sized for opening height.

D. Construction: Consisting of single- or double-ply, coated, fabric-covered, urethane-foam core with supporting frame.

1. Steel Support Frame: Steel channel frame of manufacturer's standard weight, shape, and finish; with steel mounting hardware.
2. Tapered Side Panels: Taper side panels to angle required to accommodate sloped loading dock approach grades and make sealing edge of dock shelter parallel to back edge of truck.

E. Materials:

1. Cover Fabric: Vinyl-coated nylon or polyester with minimum total weight of 40 oz./sq. yd.
2. Fabric Color: Black.
3. Guide Strips: 4-inch- wide, coated, yellow nylon guide strips on jamb pads.
4. Pleated Protectors: On face of jamb pads of overlapping layers of coated fabric attached to base fabric; 8-inch wear exposure.

F. Steel Finish: Hot-dip galvanize components to comply with the following:

1. ASTM A 123/A 123M for iron and steel support framing.
2. ASTM A 153/A 153M or ASTM F 2329 for iron and steel hardware and anchors.

2.3 RECESSED DOCK LEVELERS

A. General: Recessed, hinged-lip-type dock levelers for permanent installation in concrete pits preformed in the edge of loading platform.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. McGuire; a division of Systems, Inc. Model #MP6625

B. Standard: Comply with MH 30.1.

C. Rated Capacity: Capable of supporting total gross load of 25,000 lbs. without permanent deflection or distortion.

D. Platform: Not less than 1/4-inch- thick, nonskid steel plate.

1. Platform Size: 6’ x 6’.

2. Frame: Manufacturer's standard.
3. Toe Guards: Equip open sides of dock leveler over range indicated with metal toe guards for entire upper operating range.

E. Hinged Lip: Not less than 3/4-inch- <Insert dimension> thick, nonskid steel plate.

1. Hinge: Full-width, piano-type hinge with heavy-wall hinge tube and grease fittings, with gussets on lip and ramp for support.
2. Safety Barrier Lip: Designed to protect material-handling equipment from an accidental fall from loading platform edge of the dock leveler when the leveler is not in use.

F. Function: Dock levelers shall compensate for differences in height between truck bed and loading platform.

1. Vertical Travel: Operating range above platform level of sufficient height to enable lip to extend and clear truck bed before contact with the following minimum working range:

   a. Above Adjoining Platform: 12 inches.
   b. Below Adjoining Platform: 12 inches.

2. Automatic Vertical Compensation: Floating travel of ramp with lip extended and resting on truck bed shall compensate automatically for upward or downward movement of truck bed during loading and unloading.
3. Automatic Lateral Compensation: Tilting of ramp with lip extended and resting on truck bed shall compensate automatically for canted truck beds of up to 4 inches over width of ramp.
4. Lip Operation: Manufacturer's standard mechanism, which automatically extends and supports hinged lip on ramp edge with lip resting on truck bed over dock leveler's working range, allows lip to yield under impact of incoming truck and automatically retracts lip when truck departs.

   a. Length of Lip Extension: 20 inches.

5. Interlock: Leveler does not operate while overhead door is in closed position.

G. Mechanical Operating System: Manual control; counterbalance and spring operation. Spring-operated raising and walk-down lowering of unloaded ramp. Equip leveler with an upward-biased-spring counterbalancing mechanism controlled by a hold-down device. Ramp raises to top limit of operating range by operating recessed control handle in ramp to disengage hold-down device. Ramp lowers below platform level with lip retracted by operating auxiliary, recessed control handle to release support legs.

1. Free-Fall Protection: Manufacturer's standard protection system to limit free fall of loaded ramps with front edge supported by truck bed.

H. Construction: Fabricate dock-leveler frame, platform supports, and lip supports from structural- or formed-steel shapes. Weld platform and hinged lip to supports. Fabricate

entire assembly to withstand deformation during both operating and stored phases of service. Chamfer lip edge to minimize obstructing wheels of material-handling vehicles.

1. Cross-Traffic Support: Manufacturer's standard method of supporting ramp at platform level in stored position with lip retracted. Provide a means to release supports to allow ramp to descend below platform level.
2. Maintenance Strut: Integral strut to positively support ramp in up position during maintenance of dock leveler.

I. Materials:

1. Steel Plates, Shapes, and Bars: ASTM 36/A 36M.
2. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from steel plate complying with ASTM A 572/A 572M, Grade 55.
3. Steel Tubing: ASTM A 500/A 500M, cold formed.
4. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

J. Dock-Leveler Finish: Manufacturer's standard finish. Paint toe guards to comply with ANSI Z535.1.

K. Accessories:

1. Curb Angles: 3-by-3-by-1/4-inch galvanized-steel curb angles for edge of recessed leveler pit, with 1/2-inch- diameter by 6-inch- long concrete anchors welded to angle at 6 inches o.c.
2. Self-Forming Pan: Manufacturer's standard prefabricated, self-forming steel form system for poured-in-place construction of concrete pit.
3. Night Locks: Manufacturer's standard means to prevent extending lip and lowering ramp when overhead doors are locked.
4. Side and rear weather seals.
5. Foam insulation under dock-leveler platform.
6. Abrasive skid-resistant surface.

2.4 FINISH REQUIREMENTS

A. Galvanizing: Hot-dip galvanize components to comply with the following:

1. ASTM A 123/A 123M for iron and steel loading dock equipment.
2. ASTM A 153/A 153M or ASTM F 2329 for iron and steel hardware for loading dock equipment.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Attach dock bumpers to face of loading dock in a manner that complies with requirements indicated for spacing, arrangement, and position relative to top of platform and anchorage.

1. Welded Attachment: Plug-weld anchor holes in contact with steel inserts and fillet weld at other locations.
2. Bolted Attachment: Attach dock bumpers to preset anchor bolts embedded in concrete or to cast-in-place inserts or threaded studs welded to embedded-steel plates or angles. If preset anchor bolts, cast-in-place inserts, or threaded studs welded to embedded-steel plates or angles are not provided, attach dock bumpers by drilling and anchoring with expansion anchors and bolts.

B. Dock Seals: Attach dock-seal support frames securely to building structure in proper relation to openings, dock bumpers, and dock levelers to ensure compression of dock seals when trucks are positioned against dock bumpers.

C. Recessed Dock Levelers: Attach dock levelers securely to loading dock platform, flush with adjacent loading dock surfaces and square to recessed pit.

D. Edge-of-Dock Levelers: Attach dock levelers to loading dock platform in a manner that complies with requirements indicated for arrangement and position relative to top of platform.

1. Weld anchor holes in contact with continuous embedded loading dock edge channel. Weld or bolt bumper blocks to face of loading dock.

E. Adjust loading dock equipment to function smoothly and safely and lubricate as recommended by manufacturer.

F. Test dock levelers for vertical travel within operating range indicated.

G. After completing installation of exposed, factory-finished dock bumpers, inspect exposed finishes and repair damaged finishes.

END OF SECTION 11 13 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.
   2. 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.
   2. 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.
   3.
   4. 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.
   2. Standard: UL 1091
   3. Pressure Rating: 300 psig maximum.
   4. Body Material: ASTM A536 ductile iron.
   5. Disc: Electroless nickel coated ductile iron.
   6. Stem: Stainless steel.
      a. Stem shall be offset from the disc centerline to provide complete 360-degree circumferential seating.
   7. Actuator: Weatherproof actuator housing with handwheel and two SPDT supervisory switches.

F. Check Valves:
   1.
   2. Standard: UL312
   3. Pressure Rating: 250 psig maximum.
   4. Body Material: ASTM A536 ductile iron.
   5. Shaft and Spring: Stainless steel.
   6. 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 pieces, flat, finished to match sprinkler.
   2. Sidewall Mounting: two pieces, 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 light wall 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 were 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 were 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 solvent 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 backfilling 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 drainpipe. 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 pipes 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 as far 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 number 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 number 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 number 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 number 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 R-410
CUT OUT-325 PSIG CUT OUT- PSIG

Low Pressure Control Adjusted	___	___	___	___

R-22 R-410
RECIPICATING CUT IN-20 PSIG CUT IN- 80 PSIG
RECIPICATING CUT OUT- 5 PSIG CUT OUT- 50 PSIG
SCROLL CUT IN – 70 PSIG
SCROLL CUT OUT – 45 PSIG
NOTE: SET SHORT CYCLE COMPRESSOR TIME DELAYS TO 30 SECONDS.

Fan Control Adjusted and Siliconed	___	___	___	___

FIRST FAN AHU-1 O/A UNIT
□ CUT IN WITH COMPRESSOR START CUT IN WITH COMPRESSOR START
SECOND FAN SECOND FAN
□ 70 DEGREES 65 DEGREES
THIRD FAN THIRD FAN
□ 75 DEGREES 70 DEGREES
FOURTH FAN FOURTH FAN
□ 80 DEGREES 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

COM-C is installed, connected and verified to all racks and EMS:	EMS:		A:		B:		C:		D:
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:**

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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	1COOL #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		1COOL #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		LIST AMP DRAW FOR ALL	
AUX HT#6	INLET	AUX HT#6	INLET	COOL#2		DIS TEMP	ELECT AUX HEAT.	
	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	1The 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 (SEE BEC) (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:**

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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

Verify EMS program and outputs for all SEC/BEC schedules.

Definition of Loads and Schedules *All Schedules turning off the required fixtures per print.

SCHEDULE	Definition	Load Correct?	Using LL Sensor?
(1) WORK LIGHTS	Main sales floor lighting and lighting for all necessary areas when the store is not open to the public.		N/A
(2) 1/2 SALES LIGHTS	1 bulb in each sales area fixture which will be the same in all fixtures for uniformity.		N/A
(3) SECURITY LIGHTS	All exterior lighting (not parking lot), wall packs and sidewalk.		
(4) DELI LIGHTS	All deli area lighting and deli exhaust hoods except security light.		N/A
(5) FACIA/SIGNS	All exterior lettering for this store and road sign if applicable.		
(6) MT CASE LIGHTS	All Medium Temp Case Lighting.		N/A
(7) LT CASE LTS	All Low Temp Case Lighting.		N/A
(8) P/L LIGHTS	All Parking Lot Lights except the Parking Lot Security Lights.		
(9) GRID LIGHTS	2/3 of the available grid lights. *The other 1/3 is to be controlled by work lights.*		N/A
(10)			N/A
(11) F/R UP LTS	The wall wash up-lights at the front and rear of the store.		N/A
(12) WATER HEATERS	The electric elements for the Reclaim and Deli Water Heaters		N/A
(13) CASE UP LTS	Lights on top of the all Cases that do not provide illumination for signage.		N/A
(14) L/R UP LTS	Up-lights that provide illumination to signage on the left and right side of the store.		N/A
(15) P/L SEC LTS	Enough lights to provide security lighting for the store/shopping center.		

Exhaust Fans and Lighting: All Below should turn off with work lights schedule.

AREA NAME	FRONT OFFICE	REAR OFFICE	SECURITY ROOM	DELI OFFICE	DELI STORAGE	TRAINING ROOM	PROD PREP
LIGHT SWITCH?							
EX FAN HAS T'STAT?							
OFF WITH WORK LTS?							

AREA NAME	MEAT PREP	MEAT OFFICE	BREAK ROOM	FRONT STORAGE	REAR STORAGE	MOP ROOM	CORRIDORS
LIGHT SWITCH?							
EX FAN HAS T'STAT?	N/A					N/A	N/A
OFF WITH WORK LTS?							

AREA NAME	REST ROOMS	MOTOR ROOMS	FRONT END
LIGHT SWITCH?			
EX FAN HAS T'STAT?	N/A		
OFF WITH WORK LTS?			

LOAD	ROLL UP DOOR FAN	ROLL UP DOOR FAN	RECEIVING DOOR(S)	DOCK LIGHTS
MICRO SWITCH INSTALLED?				
LIGHT SWITCH INSTALLED?	N/A	N/A	N/A	N/A
OFF WITH WORK LTS?				

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EMS CHECKOUT

*Please note all discrepancies here:

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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 ductworks 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 ductworks shall be

constructed to a 1" pressure class. All ductworks 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 four 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 ensure 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 – 101 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 were 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 contractor’s 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 phases, 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. Sub feed (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 amperes 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" contact’s 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 condul`et 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 online 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 tests 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. Comply with Section 26 05 29 "Hangers and Supports for Electrical Systems" for channel- and angle-iron supports, and nonmetallic channel and angle supports.

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 broken 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

SECTION 31 10 00 - SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Protecting existing vegetation to remain.
2. Removing existing vegetation.
3. Clearing and grubbing.
4. Stripping and stockpiling topsoil.
5. Removing above- and below-grade site improvements.
6. Disconnecting, capping, or sealing site utilities.
7. Temporary erosion- and sedimentation-control measures.

1.2 MATERIAL OWNERSHIP

A. Except for stripped topsoil and other materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site and legally disposed of at appropriate site at Contractor’s expense and no additional cost to Owner.

1.3 PROJECT CONDITIONS

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

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction and without appropriate permits.
2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.

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

C. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.

D. Do not commence site clearing operations until temporary erosion- and sedimentation-control and plant-protection measures are in place per approved erosion and sediment control plans.

E. The following practices are prohibited within protection zones:

1. Storage of construction materials, debris, or excavated material.
2. Parking vehicles or equipment.
3. Foot traffic.
4. Erection of sheds or structures.
5. Impoundment of water.
6. Excavation or other digging unless otherwise indicated.
7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 31 20 00 "Earth Moving."

1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site. Borrow material must be obtained from a permitted site (including a phase 1 environmental report if required.)

PART 3 - EXECUTION

3.1 PREPARATION

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

B. Locate and clearly identify trees, shrubs, and other vegetation to remain or to be relocated.

C. Protect existing site improvements to remain from damage during construction.

1. Restore damaged improvements to their original condition, as acceptable and at no cost to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties,

roads, and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.

B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones. See approved grading and erosion and sedimentation control plans.

C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction and after each rainfall event until permanent vegetation has been established.

D. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal upon completion of project and establishment of full vegetative cover per erosion and sedimentation control plans.

3.3 TREE AND PLANT PROTECTION

A. General: Protect existing trees and plants to remain or be relocated on-site according to work shown on the Construction Drawings. All trees and plants to remain shall be barricaded and protected during the construction process.

1. Tree Protection

a. Erect and maintain a temporary fence directly below the drip line of the individual trees or directly below the perimeter drip line of groups of trees to remain. Remove fence when construction is complete.
b. Do not excavate, for any reason, within the area directly below the drip line of trees, unless otherwise indicated.
c. Where excavation for new construction is required within the drip line of trees, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.
d. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations, in a manner approved by the Food Lion Construction Manager.

B. Limit of clearing is to be staked and verified by Food Lion Construction Manager prior to removal of any trees.

C. All trees and plants not designated to remain within the area to be graded, shall be cut and the stumps removed. Burning on site is not permitted, unless otherwise approved by the Food Lion Construction Manager and authorities having jurisdiction.

D. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by the Food Lion Construction Manager at no cost to the owner.

3.4 EXISTING UTILITIES

A. Locate, identify, disconnect, and seal or cap utilities indicated to be removed or abandoned in place.

1. Arrange with utility companies to shut off indicated utilities.

B. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Food Lion Construction Manager not less than seven days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Owner's written permission.

C. Excavate for and remove underground utilities indicated to be removed.

D. Any unknown underground utilities or pipelines shall be removed only after verification that they are abandoned and not operable.

3.5 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.

1. Grind down stumps and remove roots, obstructions, and debris to a depth of 18 inches below exposed subgrade.
2. Use only hand methods for grubbing within protection zones.

B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.

1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches and compact each layer to a density equal to adjacent original ground.

3.6 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.

B. Strip topsoil to depth of 6 inches or greater in a manner to prevent intermingling with underlying subsoil or other waste materials.

C. Stockpile topsoil away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water in accordance with erosion and sediment control plans. Stabilize to prevent windblown dust and erosion by water.

3.7 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated on demolition plan and necessary to facilitate new construction.

3.8 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose. Removed “off owner’s property”.

END OF SECTION 31 10 00

SECTION 31 20 00 - EARTH MOVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Preparing subgrade for slabs-on-grade, walks, pavements, turf, grasses, and landscaping.
2. Excavating and backfilling for buildings and structures.
3. Drainage course for concrete slabs-on-grade.
4. Subbase course for concrete pavements.
5. Subbase course and base course for asphalt paving.
6. Excavating and backfilling for utility trenches.
7. Testing and inspection – The Contractor shall retain and pay for the services of a Soils Engineer for testing and inspection of controlled fill.

1.2 UNIT PRICES

A. Work of this section is affected by unit prices and allowances for earth moving specified in Division 1.

B. Rock measurement: Volume of rock actually removed, measured in original position, but not to exceed the following. Unit prices for rock excavation include replacement with approved materials.

1. 24 inches (600mm) outside of concrete forms other than at footings.
2. 12 inches (300mm) outside of concrete forms at footings. Additional depth may be required due to local codes or based on the geotechnical engineering study.
3. Neat outside of minimum required dimensions of concrete cast against grade.
4. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
5. 6 inches (150mm) beneath bottom of concrete slabs-on-grade.
6. 12 inches (300mm) beneath pipe invert elevation in trenches, and 12 inches (300mm) wider than outside surface of either side of pipe or conduit. Removal of rock for trench excavation will be paid as part of the corresponding utility items unless stated elsewhere in the contract documents.

1.3 DEFINITIONS

A. Backfill: Material used to fill an excavation as required by applicable regulations and per manufacturer’s specifications.

B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.

C. Bedding (pipe): Aggregate layer placed over the excavated subgrade in a trench before installing pipe.

D. Borrow Material: Satisfactory material imported from off-site for use as fill or backfill.

E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water per approved drawings.

F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated on approved plans.

1. Classified Excavation: the excavation necessary to subgrade lines and grades as shown on the contract drawings, which shall be a lump sum bid. Any and all unsuitable material, undercut excavation, mass rock excavation, trench rock excavation, mechanical rock excavation and soil stabilization shall be paid in addition to the classified excavation lump sum bid, by unit prices measured in place. In the event the Owner elects to change the lines and grades as shown on the contract drawings, unit process shall be used to increase or decrease the contract amount in accordance with the change.
2. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Food Lion Construction Manager. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices.
3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Food Lion Construction Manager. Unauthorized excavation, as well as remedial work directed by Food Lion Construction Manager, shall be without additional compensation.

G. Fill: Soil materials used to raise existing grades or backfill.

H. Rock: Rock material in beds, ledges, un-stratified masses, conglomerate deposits, and boulders of rock material defined as:

1. General excavation: Any material that cannot be excavated with a single-toothed ripper drawn by a crawler or tractor having a minimum draw bar pull rated at not less than 71,000 pounds. (Caterpillar D9N or equivalent) and occupying an original volume of at least 2 cubic yards or more.
2. Trench excavation: Any material that cannot be excavated with a backhoe having a breakout force rated at not less than 44,000lbs. (Caterpillar 235D or equivalent), and occupying an original volume of at least 2 cubic yards.
3. Mechanical excavation: Any material that must be excavated by a minimum 10,000lb. Mechanical hammer and occupying an original volume of at least 2 cubic yards.

I. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

J. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

K. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.

L. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.4 QUALITY ASSURANCE

A. Construction Conference: Conduct conference at Project site.

B. Blasting: Comply with applicable requirements in NFPA 495, “Explosive Materials Code,” and prepare a blasting plan reporting the following:

1. Types of explosives and sizes of charge to be used in each area of rock removal, types of blasting mats, sequence of blasting operations, and procedures that will prevent damage to site improvements and structures on Project site and adjacent properties.
2. Seismographic monitoring during blasting operations.

C. Blasting Requirements:

1. Perform blasting only after receiving written approval from Owner and authorities having jurisdiction.
2. Provide heavy mats as necessary to minimize concussion. Handle, store, and use explosives in accordance with the Manual of Accident Prevention in Construction by the Associated General Contractors of America, Inc., 1978 edition.

D. Seismic Survey Agency: An independent testing agency, acceptable to authorities having jurisdiction, experienced in seismic surveys, and blasting procedures to perform the following services:

1. Report types of explosives and sizes of charge to be used in each area of rock removal, types of blasting mats, sequence of blasting operations, and procedures that will prevent damage to site improvements and structures on Project site and adjacent properties.
2. Seismograph monitoring during blasting operations.

E. Contractor Qualifications: The Contractor shall provide at least one supervisory person who shall be present at all times during execution of the work and who is thoroughly familiar with the type of work being performed and its best methods for completion. This person shall have the authority to act on behalf of the Contractor.

1.5 PROJECT CONDITIONS

A. Utility Locator Service: Notify utility locator service for area where Project is located before beginning construction activity.

B. General: The Contractor shall be responsible for removal and/or relocation of existing utilities at locations where conflicts occur with proposed utility improvements whether shown or not shown on the drawings. Removal and/or relocation shall be at no additional cost to Owner.

1.6 SUBMITTALS

A. Blasting plan approved by authorities having jurisdiction is to be provided to the Owner at least 14 calendar days prior to commencement of blasting. Blasting plan to include all Federal, State, and local permits applicable to the blasting operation. Blasting will be performed in accordance with all applicable laws, regulations, ordinances and industry standards. Plan shall coordinate with grading contractor to insure appropriate safety procedures are followed including signage and signaling devices.

B. Blasting Contractor: All blasting to be performed by an insured, certified and licensed blasting contractor. Proof of applicable insurance, license and certifications must be provided to the Owner at least 30 days prior to commencement of any blasting work. **Blasting Contractor shall carry the following insurance: Workers Compensation, Comprehensive General Liability, Broad Form Property Damage, Contractual Liability and Explosion, Collapse and Underground Hazard (naming the Owner as additionally insured).** Contractor must identify and hold harmless the Owner for all claims for damages arising from the blasting operation.

C. The Blasting Contractor shall furnish a seismic survey report from seismic survey agency. The report will show the number of holes drilled, depth of holes, the burden and spacing, the amount of powder per hole, pound of powder per delay, the delay pattern, seismograph locations, and chronograph locations. The Seismic survey shall provide seismograph recordation of each blast at all adjacent structures. All reports shall be forwarded to the owner.

D. Contractor shall have the responsibility of furnishing a pre-blast survey of the surrounding area. Survey will include a one-quarter mile radius of the surrounding area.

E. The Contractor shall provide and maintain a post-blast report including the amount of material displaced by each blast, the amount of explosive utilized in each last, and the number of shots detonated. This report shall be forwarded to the Owner.

F. Pre-blast Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces, which might be misconstrued as damage caused by blasting operations. Submit before blasting begins.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations as approved by project geotechnical.

B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D 2487, or a combination of these groups; free of rock or gravel larger than 2 inches (50mm) in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487, or a combination of these groups.

1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

D. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.

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

F. Recycled Concrete Aggregate Base Course: Recycled concrete aggregate may be approved by the Owner for use in lieu of aggregate base course specified under the following conditions:

1. The graduation, plasticity soundness, and abrasion requirements of the material shall meet the governing department of transportation specifications for recycled concrete aggregate or aggregate base course.
2. The Contractor shall be required to submit a sieve analysis to the Owner for review and approval.
3. The recycled concrete aggregate shall not contain foreign materials, which includes reinforcing steel, wood, and other friable material.
4. The Contractor shall obtain all required permits and report recycled materials usage as required by the regulatory authorities having jurisdiction.
5. The Owner reserves the right to not approve use of the recycled concrete aggregate, for both pavement base structure and building pad construction. Approval of the use of recycled concrete aggregate shall only be authorized in writing by the Food Lion Construction Manager.

G. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.

H. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.

I. Drainage Course: Narrowly graded mixture of crushed stone or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.

J. All approved by project Geotech and Geotech report.

2.2 ACCESSORIES

A. Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility; colored to comply with local practice or requirements of authorities having jurisdiction.

B. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored to comply with local practice or requirements of authorities having jurisdiction.

PART 3 - EXECUTION

3.1 PREPARATION

A. Prior to bidding work within this Section, the Contractor shall become thoroughly familiar with the Geotechnical Engineering Study, existing site conditions, and all portions of the work within this Section.

B. Notify utility companies to allow removal and/or relocation of any utilities that are in conflict with the proposed improvements. Locate, identify, protect, and maintain in operating condition, existing utilities encountered during utility installation. Repair any damage to surface or subsurface improvements encountered or shown on the drawings.

C. Protect and maintain erosion and sedimentation controls during earth moving operations. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth moving operations.

D. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

E. Sheeting, shoring, bracing, temporary underpinning, or other supports made necessary by conditions of soil, locations of building, or other structures on the site or adjacent thereto, or by vibrations caused by passing traffic or equipment in operation, shall be provided by the contractor and maintained until the need for them has passed and shall be installed in accordance with Federal OSHA requirements as well as the requirements of all regulatory authorities having jurisdiction. Excavations shall be kept free from water by pumping or other approved means.

F. Any material exported or imported from or to the Project site shall be hauled from or to a site that has coverage under NPDES or State Construction General Permit (or Individual Permit). Coverage may either be under a separate Notice or included in coverage under the Project Notice. If the borrow or waste site has NPDES or State Construction General Permit coverage a copy of the Notice of Intent and Notice of Coverage (or equal) shall be placed in the SWPPP Ledger.

3.2 EXCAVATION, GENERAL

A. General

1. The building limits shall be as identified on the construction drawings. The building subgrade shall be constructed to include a minimum of 10 feet beyond the building limits, or as directed by Owner.
2. Structures include buildings, footings, foundations, retaining walls, embankment berms for storm water detention basins, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
3. The building pad subgrade shall be prepared in strict accordance with the geotechnical engineering study and these specifications, whichever is more stringent; and,
4. The Contractor shall cut or fill to the proposed subgrade elevations based on finished grades and the pavement thicknesses as shown on the drawings.

B. Classified Excavation: Excavate to subgrade elevations. Material to be excavated will be classified as earth and rock. Do not excavate rock until it has been classified and cross sectioned by Owner. The Contract Sum will be adjusted for rock excavation according to unit prices included in the Contract Documents. Changes in the Contract Time may be authorized for rock excavation.

1. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; together with soil, boulders, and other materials not classified as rock or unauthorized excavation.

a. Intermittent drilling: blasting, if permitted; ram hammering; or ripping of material not classified as rock excavation is earth excavation.

2. Rock excavation includes removal and disposal of rock. Remove rock to lines and subgrade elevations indicated to permit installation of permanent construction without exceeding the following dimensions:

a. 24 inches (600mm) outside of concrete forms other than at footings.
b. 12 inches (300mm) outside of concrete forms as footings.
c. 6 inches (150mm) outside of minimum required dimensions of concrete cast against grade.

3.3 EXCAVATION FOR STRUCTURES

A. Where existing grades are above proposed subgrade elevation, excavate materials in the building areas to line and grade as shown in the drawings being careful not to over excavate beyond the elevations needed for building subgrades. Excavate to indicated elevations and dimensions as shown on approved drawings. If applicable, extend excavations a sufficient distance for inspections.

1. Excavate organic soils from the building area. If approved by the Owner, organic soil excavation material may be used in landscaped area.
2. Excavated on-site soils which meet the requirements of the geotechnical engineer may be used as building area fill.
3. Unsuitable material, such as wood or any other deleterious materials determined to be unsuitable by the geotechnical engineer for use as on-site fill shall be disposed of off-site in accordance with this specification.

B. Excavate to indicated elevations and dimensions within a tolerance of plus 0 to minus ½ inch (12mm). If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

1. Excavations for Footings and Foundations: The excavations for footings shall be true to lines and grades, and to elevations indicated on drawings. Backfill for footings shall be well compacted to the satisfaction of the soils engineer. Where forms are not used, footing and foundation trenches shall be excavated to the exact sizes called for on the plans. Excavation for strip type footings, grade beams and pits may be to neat lines, and concrete may be deposited directly against these neat, excavated surfaces, without forms, provided the Contractor maintains such excavated surfaces to the exact dimensions of the footings; otherwise the Contractor shall extend the excavation for footings a sufficient distance from the sides of footings to allow for the placing and removal of forms. All other excavations shall be of sufficient width for properly building and inspecting the structure they are to contain and for such sheeting, shoring, plumbing, and drainage as may be necessary. Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete

reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.

2. Pile Foundations: Per Geotechnical engineer.
3. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch (25mm). Do not disturb bottom of excavations intended as bearing surfaces.

C. Excavations at Edges of Tree- and Plant-Protection Zones:

1. Excavate by hand to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.

3.4 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.5 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations.

B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit unless otherwise indicated.

1. Clearance: 12 inches each side of pipe or conduit.

C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.

1. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material, 4 inches deeper elsewhere, to allow for bedding course or as set forth on project design details.

D. Trenches in Tree- and Plant-Protection Zones:

1. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
2. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.

3.6 ADDITIONAL EXCAVATION: When soil nature is such that good bearing cannot be found at sub-grade levels indicated, additional excavating to good bearing soil will be required, the cost of which shall be the responsibility of the Contractor.

3.7 SUBGRADE INSPECTION

A. Proof-roll subgrade for the building slabs and pavements as set forth in the Geotech report to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

B. Repair subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Food Lion Construction Manager, without additional compensation.

3.8 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 4000 psi, may be used or stone backfill when approved by Food Lion Construction Manager.

1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Food Lion Construction Manager.
2. Where unauthorized excavation takes place beyond indicated grades, fill at no extra cost to Owner to indicated subgrade. Under footings, concrete shall be used for filling.

3.9 STORAGE OF SOIL MATERIALS

A. Stockpiles borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Stabilize and cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.10 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following.

1. Construction below finish grade including, where applicable, sub drainage, damp proofing, waterproofing, and perimeter insulation.
2. Surveying location of underground utilities for Record Documents.
3. Testing and inspecting underground utilities.
4. Removing concrete formwork.
5. Removing trash and debris.

6. Removing temporary shoring, bracing, and sheeting.
7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

B. Place backfill on subgrades free of mud, frost, snow, or ice.

C. Backfill for structures:

1. Place material in 6-inch layers and thoroughly compact with approved power tamper equipment suitable for the type of material used. Moisture content of material when placed shall be in proper range for compaction.
2. No backfill shall be placed against foundations, piers, or foundation walls until they have acquired sufficient strength or are adequately braced. Fill and backfill, when placed on each side of piers, walls, and freestanding structure, shall be deposited on both sides of piers and walls at the same time to approximately the same elevations. Proper provisions shall be made to prevent any wedging action against the walls or structures, and as necessary slopes bounding or within the areas to be filled or backfilled shall be stopped to prevent such wedge action.

3.11 UTILITY TRENCH BACKFILL

A. Places backfill on subgrades free of mud, frost, snow, or ice.

B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

C. Trenches under Footings: Backfill trenches excavated under footings and within 18 inches of bottom of footings with satisfactory soil or crushed stone; fill with concrete to elevation of bottom of footings. Concrete is specified in "Cast-in-Place Concrete"

D. Trenches under Roadways: Provide minimum 6-inch- thick, concrete-base slab support for piping or conduit less than 30 inches below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 6 inches of concrete before backfilling or placing roadway subbase course. Concrete is specified in "Cast-in-Place Concrete"

E. Place and compact initial backfill of satisfactory soil, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the pipe or conduit.

1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit per manufacturer’s specifications and local regulations. Coordinate backfilling with utilities testing (should be tested afterwards)

F. Place and compact final backfill of satisfactory soil to final subgrade elevation.

G. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.12 SOIL FILL

A. Fill areas to contours and elevations shown on the Construction Drawings with materials deemed satisfactory, less the topsoil depth.

B. Existing grades below building areas shall be leveled prior to fill placement. Contractor shall remove any existing lawn and topsoil in these areas prior to placement of any fill.

C. All existing grades below building, and pavement areas shall be proofrolled and compacted per this specification.

D. Plow, scarify, or bench sloped surfaces steeper than 1 vertical to 4 horizontals so fill material will bond with existing material.

E. Fill shall not be placed:

1. In areas of standing water, frozen or thawing ground or in areas that have not been approved by the geotechnical engineer.
2. During unfavorable weather conditions. When work is interrupted by heavy rains fill operations shall not be resumed until all saturated surface soils are returned to satisfactory moisture content as determined by the geotechnical engineer.

F. Place and compact fill material in layers (lifts):

1. Layers shall be made smooth and free from ruts or indentations at the end of any workday when precipitation is forecasted to prevent saturation of surface fill material. Fill surfaces shall be graded smooth to drain and sealed with a drum roller at the completion of each workday.
2. Layers (or lifts) shall not exceed recommendations in Geotechnical Engineering Study or 12 inches (300mm) in depth whichever is less and shall be compacted systematically and as recommended by the Geotechnical Testing Engineer to achieve at least 6 passes of the compactor. Larger layer thickness may be approved by the Owner as an Exception Conformation if broken rock is used and placed at least 6 feet (1.8m) below grade.
3. Each layer shall be compacted to minimum densities specified and tested by the Geotechnical Testing Engineer.

G. Layers (lifts) to required elevations as follows:

a. Under grass and planted areas, use satisfactory soil material.
b. Under walks and pavements, use satisfactory soil material.
c. Under steps and ramps, use engineered fill or stone backfill.
d. Under building slabs, use engineered fill or stone backfill.
e. Under footings and foundations, use engineered fill.

H. Place soil fill on subgrades free of mud, frost, snow, or ice. Wet or saturated material shall be air dried necessary to achieve field densities specified in this Section. Removal and replacement shall not occur without prior approval of Food Lion Construction Manager. Removal and replacement shall be used if necessary to facilitate the construction schedule.

I. Contractor shall adjust water content by aeration or adding water to achieve the required density. Assist drying by disking, harrowing or pulverizing until moisture content is reduced to achieve proper compaction and facilitate the construction schedule.

J. Contractor to remove areas of finished subgrade found to have insufficient compaction density of depth necessary and replace with suitable compacted fill as approved by the Owner. Surface subgrade after compaction shall be hard, uniform, smooth, and stable and true to grade and cross-section.

3.13 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content or as defined by geotechnical report.

1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight or as defined by geotechnical report.

3.14 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Places backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers. Unless Geotechnical Report requires less.

B. Places backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698 and as per geotechnical report:

1. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 95 percent.
2. Under turf or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 90 percent.
3. For utility trenches, compact each layer of initial and final backfill soil material at 95 percent.

3.15 PROOFROLLING

A. The work covered by this subsection consists of furnishing and operating, proofrolling equipment at the direction of the Food Lion Construction Manager or the Geotechnical Engineer.

B. Proofrolling shall be performed under the direct observation of the Geotechnical Testing Engineer and the Food Lion Construction Manager as needed and as described herein and under the following schedule:

1. Immediately following the completion of excavation to proposed subgrades in cut areas.
2. Immediately prior to stone base placement, in pavement and building pad areas for floor slab preparation.
3. Immediately following stone base placement, in pavement and building pad areas for floor slab parking area preparation.
4. Any areas which show visual signs of weakness, pumping, heaving, deflection, or rutting under loaded tandem axle equipment shall be undercut and replaced with compacted fill material or stone base course as directed by the Geotechnical Testing Engineer and as approved by the Food Lion Construction Manager, at no additional cost to the Owner. Areas where corrective action has occurred shall be proofrolled again to verify conformance with Project specifications.

C. Proofrolling shall be completed with pneumatic tired and loaded 10-wheel tandem-axle dump truck weighing not less than 20 tons (18.14tonnes) to identify soft pockets and areas of yielding. Other equipment may be used if approved by the Geotechnical Testing Engineer. Do not proofroll wet or saturated subgrades.

D. Construction methods shall be as follows:

1. Both the completed subgrade (weather cut or fill) and base course shall be proofrolled. The coverage of areas and methods shall be approved by the Geotechnical Testing Engineer.
2. The Geotechnical Testing Engineer must be able to issue the Proofroll Conformance Submittal to verify 100% of the site passes and is complete for both subgrade and base course for building pad areas and pavement areas.
3. Completely proofroll subgrade in one direction unless otherwise directed by the Food Lion Construction Manager or Geotechnical Testing Engineer.
4. The equipment speed shall be limited to 3 mph (5km/h) such that the Geotechnical Testing Engineer can comfortably and slowly walk alongside the equipment.
5. If necessary to take corrective action, follow the recommendations of the Geotechnical Testing Engineer which may include undercut and backfill, aeration of excessively wet materials, or under drain installation. These areas shall be proofrolled again following the completion of the necessary corrections. If the corrections are necessary due to the negligence of the Contractor, the corrective

work and additional proofrolling shall be performed by the contractor at no cost to the Owner.

6. The Contractor shall protect all structural facilities on the project including but not limited to box culverts, pipe culverts, and utilities from damage by the proofrolling equipment.

3.16 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:

1. Turf or Unpaved Areas: Plus, or minus 1 inch.
2. Walks: Plus, or minus .5 inch of proposed subgrade.
3. Pavements: Plus, or minus .5 inch of proposed subgrade.

C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.17 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

A. Place subbase course and base course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place subbase course and base course under pavements and walks as follows:

1. Shape subbase course and base course to required crown elevations and cross-slope grades.
2. Place subbase course and base course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
3. Compact subbase course and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 698 or per geotechnical report.

3.18 DRAINAGE COURSE UNDER CONCRETE SLABS-ON-GRADE

A. Place drainage course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows and per architectural plans:

1. Place drainage course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.

2. Compact each layer of drainage course to required cross sections and thicknesses to not less than 95 percent of maximum dry unit weight according to ASTM D 698 or per geotechnical report.

3.19 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.

B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.

C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Geotechnical Engineer.

D. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify, and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

3.20 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances were completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration.

3.21 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus satisfactory soil and waste materials, which include unsatisfactory soil, trash, and debris, and legally dispose of them from property at no additional cost to Owner.

END OF SECTION 31 20 00

SECTION 31 31 16 - TERMITE CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Soil treatment with termiticide.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include the EPA-Registered Label for termiticide products.

1.3 INFORMATIONAL SUBMITTALS

A. Product certificates.

B. Soil Treatment Application Report: Include the following:

1. Date and time of application.
2. Moisture content of soil before application.
3. Termiticide brand name and manufacturer.
4. Quantity of undiluted termiticide used.
5. Dilutions, methods, volumes used, and rates of application.
6. Areas of application.
7. Water source for application.

C. Warranties: Sample of special warranties.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A specialist who is licensed according to regulations of authorities having jurisdiction to apply termite control treatment and products in jurisdiction where Project is located and who employs workers trained and approved by manufacturer to install manufacturer's products.

B. Regulatory Requirements: Formulate and apply termiticides and termiticide devices according to the EPA-Registered Label.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: To ensure penetration, do not treat soil that is water saturated or frozen. Do not treat soil while precipitation is occurring. Comply with

requirements of the EPA-Registered Label and requirements of authorities having jurisdiction.

B. Coordinate soil treatment application with excavating, filling, grading, and concreting operations. Treat soil under footings, grade beams, and ground-supported slabs before construction.

1.6 WARRANTY

A. Soil Treatment Special Warranty: Manufacturer's standard form, signed by Applicator and Contractor, certifying that termite control work, consisting of applied soil termiticide treatment, will prevent infestation of subterranean termites. If subterranean termite activity or damage is discovered during warranty period, re-treat soil and repair or replace damage caused by termite infestation.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOIL TREATMENT

A. Termiticide: Provide an EPA-Registered termiticide, complying with requirements of authorities having jurisdiction, in an aqueous solution formulated to prevent termite infestation. Provide quantity required for application at the label volume and rate for the maximum termiticide concentration allowed for each specific use, according to product's EPA-Registered Label.

1. Products: Subject to compliance with requirements, provide the following:

a. FMC Corporation, Agricultural Products Group; Dragnet FT or Prevail.

2. Service Life of Treatment: Soil treatment termiticide that is effective for not less than five years against infestation of subterranean termites.

PART 3 - EXECUTION

3.1 APPLICATION, GENERAL

A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's EPA-Registered Label for products.

3.2 APPLYING SOIL TREATMENT

A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for moisture content of soil per termiticide label requirements,

interfaces with earthwork, slab and foundation work, landscaping, utility installation, and other conditions affecting performance of termite control.

B. Proceed with application only after unsatisfactory conditions have been corrected.

C. Soil Treatment Preparation: Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated. Loosen, rake, and level soil to be treated except previously compacted areas under slabs and footings. Termiticides may be applied before placing compacted fill under slabs if recommended in writing by termiticide manufacturer.

1. Fit filling hose connected to water source at the site with a backflow preventer, complying with requirements of authorities having jurisdiction.

D. Application: Mix soil treatment termiticide solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of termiticide, according to manufacturer's EPA-Registered Label, to the following so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction. Distribute treatment evenly.

1. Slabs-on-Grade and Basement Slabs: Underground-supported slab construction, including footings, building slabs, and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed.
2. Foundations: Adjacent soil, including soil along the entire inside perimeter of foundation walls; along both sides of interior partition walls; around plumbing pipes and electric conduit penetrating the slab; around interior column footers, piers, and chimney bases; and along the entire outside perimeter, from grade to bottom of footing. Avoid soil washout around footings.
3. Masonry: Treat voids.
4. Penetrations: At expansion joints, control joints, and areas where slabs will be penetrated.

E. Avoid disturbance of treated soil after application. Keep off treated areas until completely dry.

F. Protect termiticide solution, dispersed in treated soils and fills, from being diluted until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.

G. Post warning signs in areas of application.

H. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

END OF SECTION 31 31 16

SECTION 32 12 16 - ASPHALT PAVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cold milling of existing asphalt pavement.
2. Hot-mix asphalt patching.
3. Hot-mix asphalt paving.
4. Hot-mix asphalt overlay.
5. Minimum paving requirements (6” compacted crusher run stone base course, 2” hot plant mix binder course, and 1” hot plant asphaltic top surface course.)

B. Related Requirements:

1. Section 31 20 00 "Earth Moving" for subgrade preparation, fill material, unbound-aggregate subbase and base courses, and aggregate pavement shoulders.
2. Section 32 13 73 "Concrete Paving Joint Sealants" for joint sealants and fillers at pavement terminations.

1.2 QUALITY ASSURANCE

A. Manufacturer Qualifications: A paving-mix manufacturer registered with and approved by authorities having jurisdiction or the DOT of state in which Project is located.

B. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of state or local DOT for asphalt paving work.

1. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

PART 2 - PRODUCTS

2.1 AGGREGATES

A. Coarse Aggregate: Class A or B stone, slag, or gravel, commercial size No. 69.

B. Fine Aggregate: Sand, stone or slag screenings, commercial size Nos. 30, 40, or 60.

C. Mineral Filler: ASTM D 242/D 242M, rock, hydraulic cement, or other inert material.

2.2 ASPHALT MATERIALS

A. Asphalt Binder: AASHTO M 320, Superpave as developed by the Strategic Highway Research Program.

B. Tack Coat: ASTM D 977 or AASHTO M 140 emulsified asphalt, or ASTM D 2397 or AASHTO M 208 cationic emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application.

C. Asphalt: Commercial grade AC-8.

2.3 JOB MIX

A. Chart

SQUARE	BINDER COURSE	TOP SURFACE
SIEVE SIZE	% PASSING	% PASSING
1”	100	-
3/4”	95-100	-
1/2”	-	100
3/8”	40-75	95-100
4	-	65-85
8	20-40	45-65
16	-	30-50
50	5-20	15-30
100	0-10	5-20
200	0-5	0-10
Percent Bitumen	4.5% to 6.0%	5.5% to 7.5%
AC6 or AC8	-	-

2.4 PAVEMENT MARKING PAINT: 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. The Contractor shall verify that the striping layout meets or exceeds Food Lion's minimum standards for parking lots.

D. Paint shall be applied in strict accordance with manufacturer's printed instructions.

E. The Contractor shall take all steps necessary to prevent tracking of freshly painted markings.

PART 3 - EXECUTION

3.1 COLD MILLING (as required for store renovation projects)

A. Clean existing pavement surface of loose and deleterious material immediately before cold milling. Remove existing asphalt pavement by cold milling to grades and cross sections indicated.

1. Mill to a depth of 1-1/2 inches or as conditions dictate.
2. Patch surface depressions deeper than 1 inch after milling, before wearing course is laid.
3. Mill asphalt near concrete to tie back in flush, NO feathering of asphalt to concrete.

3.2 PATCHING (as required for store renovation projects)

A. Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches into perimeter of adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.

B. Portland Cement Concrete Pavement: Break cracked slabs and roll as required to reseat concrete pieces firmly.

1. Remove disintegrated or badly cracked pavement. Excavate rectangular or trapezoidal patches, extending into perimeter of adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Recompact existing unbound-aggregate base course to form new subgrade.

C. Tack Coat: Before placing patch material, apply tack coat uniformly to vertical asphalt surfaces abutting the patch. Apply at a rate of 0.05 to 0.15 gal./sq. yd.

1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

D. Placing Patch Material: Fill excavated pavement areas with hot-mix asphalt base mix for full thickness of patch and, while still hot, compact flush with adjacent surface.

3.3 CRACK FILLING (as required for store renovation projects)

A. Crack sealing shall be limited to 1/4" to 3/4" in width only.

B. Clean all dirt, loose gravel and weeds from cracks in preparation to apply rubberized non-tracking sealant.

C. There will be a slightly elevated band not to exceed 3" in width on the pavement of the sealed crack.

D. Based on situations, sand may be lightly sprinkled on top of crack sealant to prevent tracking when areas require being open to foot traffic.

3.4 SURFACE PREPARATION

A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.

B. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

C. Compacted crusher run stone base minimum thickness of 6 inches, unless civil drawings and/or geotechnical report dictates a thicker stone base.

D. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal./sq. yd..

1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.5 PLACING HOT-MIX ASPHALT

A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand in areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted. Paving shall consist of fine grading the areas and installing a 6 inch compacted crusher run stone base course, 2 inch hot plant mix binder course, and 1 inch hot plant asphaltic top surface course. **These are minimum requirements.** If soil conditions/geotechnical report or civil drawings call for thicker materials, the thicker materials shall be used. No other deviation shall be accepted.

1. Spread mix at a minimum temperature of 260 deg F.
2. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.

B. Place paving in consecutive strips not less than 10 feet wide unless infill edge strips of a lesser width are required.

C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.6 JOINTS

A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.

1. Clean contact surfaces and apply tack coat to joints.
2. Offset longitudinal joints, in successive courses, a minimum of 6 inches.
3. Offset transverse joints, in successive courses, a minimum of 24 inches.
4. Construct transverse joints at each point where paver ends a day's work and resumes work at a subsequent time. Construct these joints using either "bulkhead" or "papered" method according to AI MS-22, for both "Ending a Lane" and "Resumption of Paving Operations."

3.7 COMPACTION

A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.

1. Complete compaction before mix temperature cools to 200 deg F.

B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated

crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.

C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:

1. Average Density: 92 percent of reference maximum theoretical density according to ASTM D 2041, but not less than 90 percent or greater than 96 percent.

D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still heated.

E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.

F. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

G. Erect barricades to protect paving from traffic until mixture has cooled enough to prevent ruts and irregularities.

3.8 INSTALLATION TOLERANCES

A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:

1. Base Course: Per plan.
2. Surface Course: Plus 1/4 inch, no minus.

B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas and to prevent ponding or irregularities. Use caution not to exceed ADA maximum slope.

1. Base Course: 1/4 inch.
2. Surface Course: 1/8 inch.
3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch.

3.9 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. A core sample is to be taken in the presence of the Food Lion Construction Manager. Replace and compact hot-mix asphalt where core tests were taken.

C. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.10 WASTE HANDLING

A. Except for material indicated to be recycled, remove excavated materials from Project site and legally dispose of them in an EPA-approved landfill.

1. Do not allow milled materials to accumulate on-site. Perimeter protection shall be provided for milled material stockpiles temporarily stored on site where there is a potential for these materials to mix with stormwater and be discharged from the site.
2. Cleaning asphalt paving equipment and tools is not permitted on site.

PART 4 - ASPHALT REPAIR GUIDELINES

4.1 GENERAL

A. Mobilization:

1. All repairs are to be made during the daylight hours. Materials and equipment used during repair work must be stored in a safe place and staged so as not to impede store operations. Work to be performed in sections in order to keep reasonable traffic flow through the center and one entrance open at all times. All excess material must be removed from the store immediately after project completion.

B. Preconstruction Meeting:

1. Prior to the start of construction, repair contractor shall meet with the store manager to review the proposed scope of work, phasing plan, staging plan, and schedule along with any special methods and procedures required to complete the approved repairs.
2. All materials used for repair work must be VOC compliant per the local requirements, MSDS and technical data sheets must be on file at the store location.

4.2 ASPHALT REPAIRS

A. Transition Joints: (Sidewalk Apron(s), Miscellaneous Sidewalk to Asphalt)

1. Joints between asphalt and concrete are intended to be flushed. Elevation variation of 1/4" or greater to the sidewalk elevation shall be repaired. Standard method of repair is to mill existing asphalt cleanly, apply tack to the vertical face of the concrete edge and install compacted hot mix asphalt surface course.
2. If transition joint repair exceeds 50% of total length of sidewalk, it will be repaired along the entire length of storefront. If areas to be repaired are less then 50% of total length, then isolated repair will be permitted. This rule only applies to the storefront sidewalk transition joint.
3. A minimum of 2' wide 1.5" deep mill/overlay is acceptable. A wider milling width may be required due to excessive elevation variation or to provide positive draining away from the sidewalk.
4. If the asphalt is severely damaged, a full depth repair of the area may be required.

B. Alligator Cracking:

1. Low Severity Cracking in Isolated Areas: Repair will be made by mill and overlay based on location. If the distressed area is located in the drive isle, the area will need to be repaired.
2. Medium Severity Cracking: If the area has tight cracking, is close together and level, it will be repaired with full mill method. If the area is 15' in width or less, full milling of the surface should be performed to maintain proper slope for drainage. If the distressed area is 15' in width or greater and there is ample slope, a perimeter mill can be used prior to overlaying. On the larger area of distressed, paving fabric can be used to prevent reflective cracking and to increase the strength of the mat. Minimum mat thickness of 2" is required when overlaying all fabric areas. Glass Grid or Petromat paving fabric are recommended for low to medium severity cracking.
3. High Severity Cracking: (Broken, loose and uneven surface(s) in areas of High Severity Cracking, a full depth repair down to sub-base should be performed. If the distressed area is caused by the sub-base, the base will be required to be stabilized or replaced. An undercut will be to a depth of 12" below the asphalt level. Prior to placement of gravel, GEO fabric will be placed to bridge unsuitable material. Stone will be placed in three compacted lifts. The minimum width on all full depth asphalt areas should be 9' (this is due to the width of paving machine). Saw cut and/or mill past alligator cracked areas 12-18" on all sides.

C. Raveling Longitudinal Joints:

1. If the Longitudinal Joints are 3/4" and less in widths: The area will be crack filled with hot pour sealant. Joints must be air lanced, free of foreign material and moisture prior to application of crack sealant.
2. If the Longitudinal Joints are 1" or greater in width, with depressions at the joint but without base related problems: The area will be repaired with a minimum of a 2' wide (1' on each side of the crack) 2" deep mill/overlay by milling to remove surface course and overlaid to required thickness to provide smooth surface.

This will eliminate any paths for water entry into the sub-base. This repair method also levels area out to eliminate the "pounding" from traffic at the joint.

3. If the area is rutted and/or broken into pieces and is moving while under vehicular traffic: The area will be repaired by full depth asphalt repair to be made along with sub-base repair if needed.

D. Random Cracking:

1. All cracks 1/2" and wider penetrating through the binder coarse asphalt: Mechanically chase cracks and joints free of loose and foreign materials; the area will be hot-air lanced and two (2) passes of hot-pour crack sealant installed.

E. Weathered Surface: Based on severity and location of areas on site

1. Weathered surfaces in the primary customer/cart areas at the front entry that have exposed aggregate of 1/8" and greater in depth must be overlaid. These areas collect sediment and cause difficulty pushing carts across surface. The repair methods should be a slurry seal or mill and overlay with a minimum mat thickness of 1-1/2", depending on the severity of the cracking. Weathered surface in low pedestrian areas and loading areas should not be addressed directly until cracking appears and/or depressions.

F. Ponding Water or Bird Baths:

1. Action to be based on the location and depth of the water in the lot and what climate-zone the store is in. Ponding water can pose as a liability if frozen; it also causes a collection point for debris and sediment and most importantly causes premature failure of the asphalt pavement. The area should be investigated to identify what the cause of ponding water is (utility settlement, sinking base, improper elevation site at original build date etc.). If the sub-base is stable, perimeter mill and overlay level allowing positive flow to a collection point. In certain cases, water may be moving up through the sub-base from an underground spring and ponding on the surface. Under-drains may need to be connected to a nearby catch basin or drop inlet.

G. General Asphalt Repair Guideline:

1. Full depth asphalt will be minimum 3" asphalt total thickness with a minimum surface course of 1". Thicker pavement sections will be required if the pavement detail for a specific site is in excess of the standard. The minimum stone sub base thickness shall be 6". Variations from this standard may be required if a geotechnical report is available for a specific store. Asphalt surface course shall be type S-I.
2. All asphalt areas to be overlaid must be milled 1-1/2" to 2" deep around perimeters. The slope on an existing parking lot may require a full mill and overlay if a partial mill and overlay reduces the lot slope to less than 2%.

3. All edges must make a permanent, smooth transition to remaining sections of pavement.
4. Do not overlay concrete gutter pans.
5. All obliterated pavement markings, lines and/or symbols that are destroyed during repair must be reestablished in the same location to match existing size and color. Special requirements for any fire lanes shall be coordinated with the local authority having jurisdiction and Food Lion.
6. All cart corrals and other appurtenances shall be replaced in their original locations at the completion of the work.
7. Maintain positive drainage to inlets.

END OF SECTION 32 12 16

SECTION 32 13 13 - CONCRETE PAVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Driveways.
2. Roadways.
3. Curbs and gutters.
4. Walks.
5. Exterior pads.

1.2 QUALITY ASSURANCE

A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

B. ACI Publications: Comply with ACI 301 unless otherwise indicated.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

A. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, fabricated from as-drawn steel wire into flat sheets.

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

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

D. Plain-Steel Wire: ASTM A 82/A 82M, as drawn.

E. Deformed-Steel Wire: ASTM A 496/A 496M.

F. Dowel Bars: ASTM A 615/A 615M, Grade 60 plain-steel bars; zinc coated (galvanized) after fabrication according to ASTM A 767/A 767M, Class I coating. Cut bars true to length with ends square and free of burrs.

G. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified.

2.2 CONCRETE MATERIALS

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

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

B. Normal-Weight Aggregates: ASTM C 33, Class 4S, uniformly graded. Provide aggregates from a single source.

C. Water: Potable and complying with ASTM C 94/C 94M.

D. Air-Entraining Admixture: ASTM C 260.

E. Chemical Admixtures: Admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.

2.3 CURING MATERIALS

A. Water: Potable.

B. Evaporation Retarder: Waterborne, monomolecular, film forming, manufactured for application to fresh concrete.

C. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

D. White, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 2, Class B, dissipating.

2.4 RELATED MATERIALS

A. Joint Fillers: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork, or self-expanding cork in preformed strips.

2.5 PAVEMENT MARKINGS

A. Pavement-Marking Paint: SW Pro-Park Waterborne Traffic Marking Paint, B97 Series or MPI #97

1. Color: Yellow (concrete only)

2.6 CONCRETE MIXTURES

A. Prepare design mixtures, proportioned according to ACI 301, with the following properties:

1. Compressive Strength (28 Days): 4000 psi.
2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.45.
3. Slump Limit: 4 inches, plus or minus 1 inch.
4. Air Content: 5-1/2 percent plus or minus 1.5 percent.

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

2.7 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M. Furnish batch certificates for each batch discharged and used in the Work.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Proof-roll prepared subbase surface below concrete paving to identify soft pockets and areas of excess pumping or deflection. See section 31 20 00 Earth Moving.

B. Remove loose material from compacted subbase surface immediately before placing concrete.

C. The Owner reserves the right to approve the machine used, the contour and finish of the curb and gutter, and the design mix.

D. Test the subgrade with respect to elevation and density prior to setting the forms. Complete the subgrade to the plane of the typical sections shown on the drawings and to the lines and grades established by the drawings. Compact subgrades for all slabs of earth to at least 95% of maximum dry density as determined by ASTM D698 (Standard Protor).

3.2 EDGE FORMS AND SCREED CONSTRUCTION

A. After preparing the subgrades as described above, set the forms. The subgrade under the forms shall be firm and cut true to grade so that each form section will, when placed, be firmly in contact for its entire length and base width. Stake the form into position so that the top, when tested by a 10-foot straightedge, conforms to the requirement specified for the surface of the concrete and so that the longitudinal axis of the upstanding leg does not vary more than ¼ inch. Tightly lock form sections together.

B. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement. Do not use crowbars or heavy tools against green concrete when removing forms.

C. Forms shall be metal or wood.

D. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.3 STEEL REINFORCEMENT

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

3.4 JOINTS

A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.

D. Contraction (Control) Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. If not indicated, joints shall be placed 15’ o.c. maximum each way. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness:

E. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 3/8-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

F. The Food Lion Construction Manager reserves the right to designate the spaces for the expansion and contraction joints.

3.5 CONCRETE PLACEMENT

A. Concrete shall be in place within 45 minutes from the time all ingredients are charged in the mixing drum and before the concrete has obtained its initial set. Deposit concrete so that minimum handling will be necessary, and distribute it so that when consolidated and finished, the slab thickness and surface grade required by the drawings will be obtained at all points. Place concrete rapidly and continuously between expansion joints. Use shovels for any necessary hand spreading. Consolidate the concrete adjacent to forms and joints with forks and spades.

B. Do not place concrete when the ambient temperature is below 35 degrees F, nor when the concrete is, without special protections, likely to be subject to freezing temperatures before final setting has occurred. The temperature of the concrete when placed shall be no less than 50 degrees F, nor more than 90 degrees F. Heating of the mixing water and/or aggregates will not be permitted until the temperature of the concrete has decreased to 55 degrees F. Heated materials shall be free from ice, snow, and frozen lumps before entering the mixer. Methods and equipment for heating shall be subject to the Architect/Engineer's approval. Provide suitable means for maintaining the concrete at a temperature of at least 40 degrees F for no less than 72 hours after placement. Any concrete damaged by freezing shall be removed at the expense of the General Contractor.

C. Moisten subbase to provide a uniform dampened condition at time concrete is placed.

D. Comply with ACI 301 requirements for measuring, mixing, transporting, placing, and consolidating concrete.

E. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

3.6 FINISHING

A. Immediately after placement, properly finish the concrete. The sequence of operations shall be as follows:

1. Hand Finishing
2. Longitudinal floating
3. Straightedge finishing
4. Edging the joints

B. Provide an approved hand strike template, approved tamping template, and a longitudinal float for the hand finishing of the pavement. The templates shall be at least 1.0 feet longer than the pavement width and at least 4 inches wide. The

longitudinal float shall be 6 to 8 feet long. The float shall be ridged and substantially braced and provided with suitable handles to ensure smooth and effective manipulation. The bottom edges of the base of the float shall be rounded. Floats made of metal, or a combination of wood and metal may be used. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

C. As soon as concrete is placed, strike off and screed to the appropriate cross section and to an elevation above grade which, when the concrete is consolidated and finished, will ensure that the surface of the pavement is at the exact elevation indicated on the drawings. Tamp the entire surface and continue tamping until the required compaction and reduction of internal and surface voids are secured. Immediately after the final tamping of the surfaces, float the pavement longitudinally by hand. If contact with the pavement is not made at all points by the float, additional concrete shall be required and screeded, and the float operated until a satisfactory surface is obtained.

D. After the longitudinal floating is complete, eliminate minor irregularities and score marks remaining in the pavement surface by removing surplus material or, if necessary, by adding and working in freshly mixed concrete with long handled floats and filling in open textured areas in the pavement surfaces. Make the final finish with straightedges 8 feet in length. A straightedge operated from the side of the pavement shall be equipped with a handle 3 feet longer than ½ of the pavement width. Place the straightedge at the centerline and pull uniformly to the edge. Do not advance the straightedge along the pavement in successive stages more than ½ its length. Immediately fill depressions with freshly mixed concrete, strike off, consolidate, and refinish. Remove projections above the required elevation while the concrete is still plastic and workable, doing so in a timely sequence that will ensure the removal of all water and laitance from the surface. Continue straightedge testing and refloating until the entire surface is free from observable departures from the straightedge, conforms to the required grade and contour, and will, when the concrete has hardened, conform with the surface requirements specified herein.

E. After hand finishing has been completed but before the concrete has attained initial set, carefully finish the edges of slabs along forms and at joints with an edging tool of ½ inch radius to form a smooth, rounded surface. Clean corners or edges of slabs that have crumbed and any areas that lack enough mortar for proper finishing by removing loose fragments and soupy mortar, and then fill solidly and finish with a mixture of the concrete proportions and appropriate consistency. Eliminate unnecessary tool marks, and leave edges smooth and true to line. After removing the forms, fill any damaged or honeycombed areas with mortar composed of one part cement and two parts sand.

F. General: Do not add water to concrete surfaces during finishing operations.

G. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared, and concrete surface has stiffened sufficiently to permit operations. Float

surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.

1. Light Textured Broom Finish: Provide a light finish by striating float-finished concrete surface 1/16 deep with a stiff-bristled broom, perpendicular to line of traffic.

2. Cure concrete with curing compound recommended by slip-resistive aggregate manufacturer. Apply curing compound immediately after final finishing.
3. After curing, lightly work surface with a steel wire brush or abrasive stone and water to expose nonslip aggregate.

3.7 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Comply with ACI 306.1 for cold-weather protection.

C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb./sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.

D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

E. Curing Methods: Cure concrete by curing compound.

3.8 PAVING TOLERANCES

A. Comply with tolerances in ACI 117 and as follows:

1. Elevation: Per plan.
2. Thickness: Plus 3/8-inch, minus 1/4 inch.
3. Surface: Gap below 10-foot- long, unleveled straightedge not to exceed 1/4 inch.
4. Joint Spacing: 3 inches.
5. Contraction Joint Depth: Plus 1/4 inch, no minus.
6. Joint Width: Plus 1/8 inch, no minus.

B. Remove any portion and replace or correct as directed by Food Lion Construction Manager.

3.9 PAVEMENT MARKING

A. Allow concrete paving to cure for a minimum of 28 days and be dry before starting pavement marking.

B. Sweep and clean surface to eliminate loose material and dust.

C. Apply paint with mechanical equipment to produce markings of dimensions indicated with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils (2 coats minimum).

3.10 REPAIRS AND PROTECTION

A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Food Lion Construction Manager.

B. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.

C. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 32 13 13

SECTION 32 13 73 - CONCRETE PAVING JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cold-applied joint sealants.
2. Hot-applied joint sealants.
3. Joint-sealant backer materials.
4. Primers.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

2.2 COLD-APPLIED JOINT SEALANTS

A. Single-Component, Nonsag, Silicone Joint Sealant: ASTM D 5893/D 5893M, Type NS.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Crafco Inc., an ERGON company; RoadSaver Silicone.
b. Dow Corning Corporation; 888.
c. Pecora Corporation; 301 NS.

B. Single-Component, Self-Leveling, Silicone Joint Sealant: ASTM D 5893/D 5893M, Type SL.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Crafco Inc., an ERGON company; RoadSaver Silicone SL.
b. Dow Corning Corporation; 890-SL.
c. Pecora Corporation; 300 SL.

2.3 JOINT-SEALANT BACKER MATERIALS

A. Round Backer Rods for Cold-Applied Joint Sealants: ASTM D 5249, Type 3, of diameter and density required to control joint-sealant depth and prevent bottom-side adhesion of sealant.

2.4 PRIMERS

A. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated.

PART 3 - EXECUTION

3.1 INSTALLATION OF JOINT SEALANTS

A. Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.

B. Cleaning of Joints: Clean out joints immediately to comply with joint-sealant manufacturer's written instructions. Blow out joints free of dust with compressed air.

C. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer.

D. Joint-Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions.

E. Install joint-sealant backings to support joint 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 joint-sealant backings.
2. Do not stretch, twist, puncture, or tear joint-sealant backings.
3. Remove absorbent joint-sealant backings that have become wet before sealant application and replace them with dry materials.

F. Install joint sealants immediately following backing installation, using proven techniques that comply with the following:

1. Place joint sealants so they fully contact 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.

G. Tooling of Nonsag Joint Sealants: Immediately after joint-sealant application and before skinning or curing begins, tool sealants according to the following requirements 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 joint sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.

H. Provide joint configuration to comply with joint-sealant manufacturer's written instructions unless otherwise indicated.

I. Clean off excess joint sealant as the Work progresses, by methods and with cleaning materials approved in writing by joint-sealant manufacturers.

END OF SECTION 32 13 73

SECTION 32 91 13 – SOIL PREPARATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Components of planting mediums.
2. Testing and certification of components.
3. Mixing of planting mediums.
4. Transporting of mediums.
5. Soil and soil amendments products including all imported landscape soil as required to make up deficiencies in quantity of stockpiled native topsoil available on site.

1.2 DEFINITIONS

A. Backfill: The earth used to replace or the act of replacing earth in an excavation.

B. Finish Grade: Elevation of finished surface of planting soil.

C. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill, before placing planting soil.

D. Topsoil: Soil with organic content suitable for sustaining the growth of a soil stabilizing ground cover such as turf. Topsoil is spread over prepared subgrade.

1. Stockpiled Native Topsoil: Topsoil stripped from the site prior to rough grading work to be spread and amended as specified (When available). No onsite soil may be used as topsoil unless approved by Landscape Architect. Soil cut from non-organic layers will not be considered for use as topsoil.
2. Imported Landscape Topsoil: Offsite topsoil imported and stockpiled to be spread and amended as specified.

1.3 CLOSEOUT SUBMITTALS

A. Product Data: For each type of product indicated, furnish manufacturer’s literature, certifications, sources, samples, and laboratory analytical data.

1. Organic amendments.
2. Topsoil.
3. Sand.

4. Mulch.
5. Plant bed mix.
6. Fertilizer.
7. Soil amendments.
8. Pre-emergent herbicide.

1.4 QUALITY ASSURANCE

A. Testing: Soil testing laboratory shall be approved by Owner. Soils laboratory shall be capable of providing all tests outlined in this section and shall provide recommendations and rates of applications per 1000 sq. ft. for soil amendments, soil chemistry, and soil placement.

1. All costs for testing shall be paid for by Contractor.
2. Materials to be Tested:

    a. Stockpiled Native topsoil 3 samples minimum from at least 3 different locations within the stockpile.
    b. Imported Landscape soils 3 samples minimum from at least 3 different locations within the stockpile.

3. Agricultural Test Reports: Stockpiled Native Topsoil, Imported Landscape Soils, and Subgrade Soil shall be tested as follows:

    a. Fertility (as expressed in measures of pH, salinity, nitrates, ammonium, phosphate, potassium, calcium, and magnesium).
    b. Agricultural Suitability (sodium absorption ratio, sodium acetate and extractable calcium).
    c. Particle Size: Classify the soil by USDA standards including particle size and organic content notations. Lab reports to conform to material specification description for sieve sizes.
    d. Heavy metals (cadmium, lead, arsenic, aluminum).
    e. Soils lab may require additional tests due to field conditions.

4. Fertility Considerations: In the event of nutrient inadequacies, provisions shall be made to add required materials in soils to overcome inadequacies prior to planting.
5. Imported Landscape Topsoil: Test for herbicide contamination.
6. Certificates: Certify strict compliance with accepted soil mixes and amendments, including rate of application.

PART 2 - PRODUCTS

2.1 NATIVE LANDSCAPE TOPSOIL

A. Stockpiled Native Topsoil

1. Quantity: Approximate quantity of stockpiled native topsoil will not be known until demolition and rough grading have been completed under Civil Work.
2. Stockpiling: Stockpile stripped topsoil onsite.
3. Composition: Fertile, friable, well-drained soil, of uniform quality, free of stones over 1 inch diameter, sticks, oils, chemicals, plaster, concrete, and other deleterious materials.
4. Analysis: Obtain an agricultural suitability analysis of the proposed topsoil from an accepted, accredited Testing Agency at Contractor's cost.
5. Test Results: Request Testing Agency to send one (1) copy of test results directly to Landscape Architect and one (1) copy to the Owner. Imported topsoil shall be amended per soils analysis report.

B. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which begins at root flare according to ANSI Z60.1. Root flare shall be visible before planting.

C. Annuals and Biennials: Provide healthy, disease-free plants of species and variety shown or listed, with well-established root systems reaching to sides of the container to maintain a firm ball, but not with excessive root growth encircling the container. Provide only plants that are acclimated to outdoor conditions before delivery and that are in bud but not yet in bloom.

2.2 IMPORTED TOPSOIL

A. GRADING:

Sieve Size	Percent Passing Sieve
25.4 mm (1")	95-100
9 Sl mm (3/8")	85-100
53 Micron (270 mesh)	10-30

B. Chemistry - Suitability Considerations:

1. Salinity: Saturation Extract Conductivity (ECe x 103 @ 25 degrees C.) less than 4.0.
2. Sodium: Sodium Absorption Ratio (SAR) less than 9.0.
3. Boron: Saturation Extract Concentration less than 1.0 PPM.

4. Reaction: pH of Saturated Paste: 6.0 - 7.5.

C. Pests: The population of any single species of plant pathogenic nematode shall be fewer than 500 per pint of soil.

D. Fertility Considerations: Soil to contain sufficient quantities of available nitrogen, phosphorus, potassium, calcium, and magnesium to support normal plant growth. In the event of nutrient inadequacies, provisions shall be made to add required materials to overcome inadequacies prior to planting.

E. Source of above shall be approved and conformity of material shall be laboratory verified for each 100 cubic yards of material delivered to the site.

F. Composition: Fertile, friable, well-drained soil, of uniform quality, free of stones over 1 in. diameter, sticks, oils, chemicals, plaster, concrete and other deleterious materials.

2.3 MULCHES

A. Organic Mulch: Shredded hardwood, shredded pine bark or pine needles as indicated on drawings.

2.4 SAND

A. Grading: Clean bank sand free of deleterious materials and clumps larger than 1 inch in diameter.

B. Planting Bed Mix/Tree Backfill: Sharp sand.

2.5 CHEMICAL ADDITIVES

A. The following soil components listed shall be applied at rates shown as determined by soil tests. Till additives into existing soil for all grassed areas.

1. Gypsum: Agricultural grade product containing 80 percent minimum calcium sulphate. Apply at a rate of 6lbs./1000 sq. ft.
2. Boil Sulphur: Agricultural grade Sulphur containing a minimum of 96 percent Sulphur. Apply at a rate of .2 lbs./1000 sq. ft.
3. Apply the following micronutrients at the rates shown:

    a. Zinc: .05 ounces/1000 sq. ft.
    b. Manganese: .05 ounces/1000 sq. ft.
    c. Copper: .05 ounces/1000 sq. ft.

2.6 PLANTING MEDIA

A. Thoroughly mix planting media in the following proportions:

1. 1-part sharp sand
2. 1-part topsoil
3. 1-part pine bark mulch

B. The ratio of mix components may be altered during Contract period to meet site conditions found different in various Project areas.

1. Chemical additives – determined by soil tests.
2. Maintain pH at 6.5 to 7.5.

PART 3 - EXECUTION

3.1 SOIL MOISTURE CONTENT

A. Do not work soil when the following conditions occur:
1. Moisture content is so great that excessive compaction will occur.
2. When it is so dry that dust will form in air or where clods will not break readily.
3. When it is frozen.

B. Apply water if necessary to bring soil to optimum moisture content for tilling and planting.

3.2 CLEARING AND CULTIVATION

A. Clearing: Clear all planting areas of stones 1-1/2 in. diameter and larger, weeds, debris, and other extraneous materials prior to soil preparation work.

B. Cultivation of Subgrade:

1. Verification:

a. Verify that subgrades for installation of stockpiled native topsoil and imported landscape soil have been established under rough grading and have been approved by the landscape architect. Do not spread landscape soil prior to acceptance of subgrade work.
b. Depth: Verify that subgrades are 4 inch minimum below finished grades, + 1 inch. Report all variations.

2. Cultivation: Rip or cultivate rough grade in all lawn and planting areas to a depth of 4 inches immediately prior to spreading stockpiled native topsoil or imported landscape soil.

3.3 SPREADING, DEPTH AND AMENDING OF IMPORTED LANDSCAPE SOIL

A. Sequence: Existing soil subgrade cultivation and amending to be approved prior to spreading stockpiled native topsoil or imported landscape soils.

B. Install stockpiled topsoil in low areas to bring the rough grade to within plus or minus 1 foot.

C. Place in lifts of 3 inches maximum where necessary.

3.4 MIXING

A. Till soil amendments into existing soil for grassed areas with the use of mechanical tiller to a depth of 4 inches.

B. Mix soil base, amendments, and chemical additives by mechanical means. Do not mix additives with excavated material at the plant pit site.

C. Mechanical means should thoroughly mix all amendments with soil or soil-less base.

D. Soil and sand bases shall be completely pulverized and free of lumps or aggregated material. Moisture content of base materials shall not be such that chemical granular or pelletized additives become dissolved before thorough mixing.

E. Mix media in quantities of not less than 50 cubic yards or mix total quantity required if less than 100 cubic yards. Contractor shall be responsible for continuity between batches.

F. The Contractor shall keep in storage, at his own expense, sufficient quantities of mix to repair any settling or to adjust grades throughout the warranty period. Do not apply pruning paint to wounds.

3.5 FIELD QUALITY CONTROL

A. Landscape Architect reserves the right to take and have a Soils Testing Laboratory analyze soil samples at the site.

B. Immediately remove rejected materials from site. Replacements are subject to all specified requirements.

C. Contractor shall bear final responsibility for proper surface drainage of planted areas. Any discrepancy in the Drawings or Specifications, obstructions on the site, or prior work done by another party, which Contractor feels precludes establishing proper drainage shall be brought to the attention of Landscape Architect in writing for correction or relief of said responsibility.

END OF SECTION 32 91 13

SECTION 32 92 00 - TURF AND GRASSES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Seeding.
2. Hydroseeding: Must be approved by Owner before application.

1.2 DEFINITIONS

A. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

B. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws, as applicable.

PART 2 - PRODUCTS

2.1 SEED

A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Rules for Testing Seeds" for purity and germination tolerances.

B. Seed Species:

1. Seed mixture and rate of application shall conform to US Department of Agriculture recommendations for this location and season of planting. The Contractor shall return in late winter or early spring and reseed to establish permanent cover.

2.2 FERTILIZERS

A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

1. Composition: 1 lb./1000 sq. ft. of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.

2.3 MULCHES

A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.

B. Sphagnum Peat Mulch: Partially decomposed sphagnum peat moss, finely divided or of granular texture, and with a pH range of 3.4 to 4.8.

C. Muck Peat Mulch: Partially decomposed moss peat, native peat, or reed-sedge peat, finely divided or of granular texture, with a pH range of 6 to 7.5, and having a water-absorbing capacity of 1100 to 2000 percent, and containing no sand.

D. Compost Mulch: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch sieve; soluble salt content of 2 to 5 Deci siemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

2.4 PESTICIDES

A. General: Pesticide, registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

PART 3 - EXECUTION

3.1 TURF AREA PREPARATION

A. General: Prepare planting area for soil placement and mix planting soil according to Section 32 91 13 "Soil Preparation."

B. Areas to be grassed shall be cleared of all trees, stumps, existing structures, and other debris.

C. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

D. Before planting, obtain Food Lion Construction Manager's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.2 SEEDING

A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph.

1. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
2. Do not use wet seed or seed that is moldy or otherwise damaged.
3. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.

B. Sow seed at a total rate as recommended by the US Dept. of Agriculture for the climate where the project is located.

C. Rake seed lightly into top 1/8 inch of soil, roll lightly, and water with fine spray.

D. Protect seeded areas with slopes not exceeding 1:3 or as indicated on drawings by spreading straw mulch. Spread uniformly at a minimum rate of 2 tons/acre to form a continuous blanket 1-1/2 inches in loose thickness over seeded areas. Protect seeded areas with slopes exceeding 1:3 with reinforced erosion control protection blanket or as indicated on drawings.

1. Anchor straw mulch by crimping into soil with suitable mechanical equipment.

E. Protect seeded areas from hot, dry weather or drying winds by applying compost mulch within 24 hours after completing seeding operations. Soak areas, scatter mulch uniformly to a thickness of 3/16 inch.

F. Hydroseeding: (written approval required by Owner) Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogenous slurry suitable for hydraulic application.

1. Mix slurry with non-asphaltic fiber-mulch, or manufacturer’s recommended tackifier.
2. Apply slurry uniformly to all areas to be seeded in a two-step process. Apply first slurry coat at a rate so that mulch component is deposited at not less than 500lb/acre (5.2kg/92.9sq m) dry weight, and seed component is deposited at not

less than the specified seed-sowing rate. Apply slurry cover coat of fiber mulch (hydro mulching) as indicated on the drawings or at a rate of 1000lb/acre (10.4kg/92.9 sq m).

3.3 TURF MAINTENANCE

A. General: Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.

B. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than one-third of grass height. Remove no more than one-third of grass-leaf growth in initial or subsequent mowings.

3.4 SATISFACTORY TURF

A. Turf installations shall meet the following criteria as determined by Architect:

1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft.

B. After grass growth has started, all areas or parts of areas, which fail to show a uniform stand of grass for any reason whatsoever shall be re-seeded repeatedly until all areas are covered with a satisfactory growth of grass at no additional cost to the Owner.

C. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

3.5 CLEANUP AND PROECTION

A. Promptly remove soil and debris created by turf work from paved areas.

B. Remove nondegradable erosion control measures after grass establishment period.

END OF SECTION 32 92 00

SECTION 32 93 00 - PLANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Plants.

1.2 DEFINITIONS

A. Backfill: The earth used to replace or the act of replacing earth in an excavation.

B. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant. Some sources classify herbicides separately from pesticides.

C. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth. See Section 32 91 13 "Soil Preparation" for drawing designations for planting soils.

D. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots, the area of transition between the root system and the stem or trunk.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance Data: Recommended procedures to be established by Owner for maintenance of plants during a calendar year.

1.4 QUALITY ASSURANCE

A. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.

1. Pesticide Applicator: State licensed, commercial.

B. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver bare-root stock plants within 24 hours of digging. Immediately after digging up bare-root stock, pack root system in wet straw, hay, or other suitable material to keep root system moist until planting. Transport in covered, temperature-controlled vehicles, and keep plants cool and protected from sun and wind at all times.

B. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.

C. Handle planting stock by root ball.

D. Store bulbs, corms, and tubers in a dry place at 60 to 65 deg F until planting.

E. Deliver plants after preparations for planting have been completed and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.

1.6 WARRANTY

A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.

1. Failures include, but are not limited to, the following:

    a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner.
    b. Structural failures including plantings falling or blowing over.

2. Warranty Periods: From date of **FINAL ACCEPTANCE** by the Owner.

    a. Trees, Shrubs, Vines, and Ornamental Grasses: 12 months or as required by local governing agency, whichever time period is longer.
    b. Ground Covers, Biennials, Perennials, and Other Plants: 12 months or as required by local governing agency, whichever time period is longer.
    c. Annuals: Twelve months.

PART 2 - PRODUCTS

2.1 PLANT MATERIAL

A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant List, Plant Schedule, or Plant Legend indicated on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

1. All plants shall have come from locations and grown under climatic conditions similar to those in the locality of the site of the project under construction or have been acclimated to such conditions for a time of 2 years.

B. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which begins at root flare according to ANSI Z60.1. Root flare shall be visible before planting.

C. Annuals and Biennials: Provide healthy, disease-free plants of species and variety shown or listed, with well-established root systems reaching to sides of the container to maintain a firm ball, but not with excessive root growth encircling the container. Provide only plants that are acclimated to outdoor conditions before delivery and that are in bud but not yet in bloom.

2.2 FERTILIZERS

A. Planting Tablets: Tightly compressed chip-type, long-lasting, slow-release, commercial-grade planting fertilizer in tablet form. Tablets shall break down with soil bacteria, converting nutrients into a form that can be absorbed by plant roots.

1. Size: 10-gram tablets.
2. Nutrient Composition: 20 percent nitrogen, 10 percent phosphorous, and 5 percent potassium, by weight plus micronutrients.

2.3 MULCHES

A. Organic Mulch: Shredded hardwood, shredded pine bark or pine needles as indicated on drawings.

2.4 WEED-CONTROL BARRIERS

A. Nonwoven Geotextile Filter Fabric: Polypropylene or polyester fabric, 3.5 oz./sq. yd. minimum, composed of fibers formed into a stable network so that fibers retain their relative position. Fabric shall be inert to biological degradation and resist naturally encountered chemicals, alkalis, and acids.

B. Composite Fabric: Woven, needle-punched polypropylene substrate bonded to a nonwoven polypropylene fabric, 4.8 oz./sq. yd.

2.5 PESTICIDES

A. General: Pesticide registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

2.6 LANDSCAPE EDGINGS

A. Plastic Edging: Standard black polyethylene or vinyl edging, V-lipped bottom, extruded in standard lengths, with 9-inch steel angle stakes.

1. Manufacturers: Subject to compliance with requirements listed above.
2. Edging Size: 0.1 inch thick by 5 inches deep.

PART 3 - EXECUTION

3.1 PLANTING AREA ESTABLISHMENT

A. Loosen subgrade of planting areas to a minimum depth of 6 inches (150 mm) for turf areas and 12 inches (300 mm) for shrub bed areas. Remove stones larger than 1 inch (25 mm) in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner’s property.

1. Spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil.

a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
b. Mix lime (if liming is required) with dry soil before mixing fertilizer. Ground limestone to be omitted for acid soil plants.

2. Spread planting soil to a depth of 6 inches (150 mm) for turf areas, and 12 inches (300 mm) for shrub beds, but not less than required to meet finish grades after natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.

    a. Spread approximately one-half the thickness of planting soil over loosened subgrade. Mix thoroughly into top 2 inches (50 mm) of subgrade. Spread remainder of planting soil.
    b. Planting soil which must be transported across finished walks shall be delivered in such a manner that no damage will be done to the walks. The Contractor shall be responsible for repair of such damage.
    c. Placement shall be such that after final settlement where will be good drainage (and conforming to the elevations shown on drawings).

B. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

C. Before planting, obtain Food Lion Construction Manager acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

D. Application of Mycorrhizal Fungi: If indicated on the drawings, and at time directed by Owner, broadcast dry product uniformly over prepared soil at application rate indicated on drawings.

3.2 EXCAVATION FOR TREES AND SHRUBS

A. Planting Pits and Trenches: Excavate circular planting pits.

1. Excavate planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are unacceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.
2. Excavate approximately three times as wide as ball diameter.
3. Excavate at least 12 inches wider than root spread and deep enough to accommodate vertical roots for bare-root stock.
4. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.

B. Backfill Soil: Subsoil and topsoil removed from excavations may be used as backfill soil unless otherwise indicated.

3.3 TREE, SHRUB, AND VINE PLANTING

A. Inspection: At time of planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.

B. Roots: Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.

C. Set each plant plumb and in center of planting pit or trench with root flare 1 inch above adjacent finish grades.

1. Backfill: Planting soil. For trees, use excavated soil for backfill.
2. Balled and Burlapped Stock: After placing some backfill around root ball to stabilize plant, carefully cut, and remove burlap, rope, and wire baskets from tops of root balls and from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.
3. Balled and Potted and Container-Grown Stock: Carefully remove root ball from container without damaging root ball or plant.
4. Fabric Bag-Grown Stock: Carefully remove root ball from fabric bag without damaging root ball or plant. Do not use planting stock if root ball is cracked or broken before or during planting operation.
5. Bare-Root Stock: Support stem of each plant and spread roots without tangling or turning toward surface. Plumb before backfilling and maintain plumb while working. Carefully work backfill around roots by hand. Bring roots into close contact with the soil.
6. Backfill around root ball in layers, tamping to settle soil, eliminate voids, and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
7. Place planting tablets equally distributed around each planting pit when pit is approximately one-half filled. Place tablets beside the root ball about 1 inch from root tips; do not place tablets in bottom of the hole.
    a. Bare-Root Stock: Place tablets beside soil-covered roots; do not place tablets touching the roots.
    b. Quantity: Two per plant.
8. Continue backfilling process. Water again after placing and tamping final layer of soil.
9. Stake and guy trees as indicated on drawings.

D. Slopes: When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.

3.4 TREE, SHRUB, AND VINE PRUNING

A. Remove only dead, dying, or broken branches. Do not prune for shape.

B. Do not apply pruning paint to wounds.

3.5 GROUND COVER AND PLANT PLANTING

A. Set out and space ground cover and plants other than trees, shrubs, and vines as indicated on Drawings in even rows with triangular spacing.

B. Use planting soil for backfill.

C. Dig holes large enough to allow spreading of roots.

D. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.

E. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.

F. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.6 PLANTING AREA MULCHING

A. Install weed-control barriers before mulching according to manufacturer's written instructions. Completely cover area to be mulched, overlapping edges a minimum of 6 inches and secure seams with galvanized pins.

B. Mulch backfilled surfaces of planting areas and other areas indicated.

1. Trees and Treelike Shrubs in Turf Areas: Apply organic mulch ring of 3-inch average thickness, with 30-inch radius around trunks or stems. Do not place mulch within 6 inches of trunks or stems.
2. Organic Mulch in Planting Areas: Apply 3-inch average thickness of organic mulch extending 12 inches beyond edge of individual planting pit or trench and over whole surface of planting area, and finish level with adjacent finish grades. Do not place mulch within 6 inches of trunks or stems.

3.7 EDGING INSTALLATION

A. Plastic Edging: Install plastic edging were indicated according to manufacturer's written instructions. Anchor with steel stakes spaced approximately 36 inches apart, driven through upper base grooves or V-lip of edging.

B. Shovel-Cut Edging: Separate mulched areas from turf areas, curbs, and paving with a 45-degree, 4- to 6-inch- deep, shovel-cut edge as indicated on Drawings.

3.8 INSTALLING SLOW-RELEASE WATERING DEVICE

A. Provide one device for each tree as indicated on drawings.

3.9 PLANT MAINTENANCE

A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings.

B. Fill in, as necessary, soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.

C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated pest management practices, when possible, to minimize use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

D. Apply pesticides and other chemical products and biological control agents according to authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

E. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.

END OF SECTION 32 93 00

SECTION 33 41 00 - STORM UTILITY DRAINAGE PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pipe and fittings.
2. Channel drainage systems.
3. Encasement for piping.
4. Manholes.
5. Cleanouts.
6. Nonpressure transition couplings.
7. Expansion joints.
8. Catch basins.
9. Stormwater inlets.
10. Pipe outlets.

1.2 PROJECT CONDITIONS

A. Interruption of Existing Storm Drainage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify Owner and Construction Supervisor no fewer than two days in advance of proposed interruption of service.
2. Do not proceed with interruption of service without Owner and Food Lion Construction Manager's written permission.

PART 2 - PRODUCTS

2.1 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 74, Service class.

B. Gaskets: ASTM C 564, rubber.

C. Calking Materials: ASTM B 29, pure lead and oakum or hemp fiber.

D. Per local requirements and codes.

2.2 HUBLESS CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 888 or CISPI 301.

B. Heavy-Duty, Shielded Couplings:

1. Description: ASTM C 1277 and ASTM C 1540, with stainless-steel shield; stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

2.3 DUCTILE-IRON, CULVERT PIPE AND FITTINGS

A. Pipe: ASTM A 716, for push-on joints.

B. Standard Fittings: AWWA C110, ductile or gray iron, for push-on joints.

C. Compact Fittings: AWWA C153, for push-on joints.

D. Gaskets: AWWA C111, rubber.

2.4 POLYETHYLENE (PE) PIPE AND FITTINGS

A. Corrugated PE Drainage Pipe and Fittings NPS 3 to NPS 10: AASHTO M 252M, Type S, with smooth waterway for coupling joints.

1. Silt tight Couplings: PE sleeve with ASTM D 1056, Type 2, Class A, Grade 2 gasket material that mates with tube and fittings.
2. Soil tight Couplings: AASHTO M 252M, corrugated, matching tube and fittings.

B. Corrugated PE Pipe and Fittings NPS 12 to NPS 60: AASHTO M 294M, Type S, with smooth waterway for coupling joints.

1. Silt tight Couplings: PE sleeve with ASTM D 1056, Type 2, Class A, Grade 2 gasket material that mates with pipe and fittings.
2. Soil tight Couplings: AASHTO M 294M, corrugated, matching pipe and fittings.

2.5 PVC PIPE AND FITTINGS

A. PVC Corrugated Sewer Piping:

1. Pipe: ASTM F 949, PVC, corrugated pipe with bell-and-spigot ends for gasketed joints.
2. Fittings: ASTM F 949, PVC molded or fabricated, socket type.

3. Gaskets: ASTM F 477, elastomeric seals.

2.6 CONCRETE PIPE AND FITTINGS

A. Reinforced-Concrete Sewer Pipe (RCP) and Fittings: ASTM C 76.

1. Bell-and-spigot ends and gasketed joints with ASTM C 443, rubber gaskets
2. Class II, Wall A Wall B Wall C unless noted otherwise on drawings.

2.7 NONPRESSURE TRANSITION COUPLINGS

A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined, and corrosion-resistant-metal tension band and tightening mechanism on each end.

B. Sleeve Materials:

1. For Concrete Pipes: ASTM C 443, rubber.
2. For Cast-Iron Soil Pipes: ASTM C 564, rubber.
3. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
4. For Dissimilar Pipes: ASTM D 5926, PVC, or other material compatible with pipe materials being joined.

C. Unshielded, Flexible Couplings:

1. Description: Elastomeric sleeve with stainless-steel shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.

D. Shielded, Flexible Couplings:

1. Description: ASTM C 1460, elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.

E. Ring-Type, Flexible Couplings:

1. Description: Elastomeric compression seal with dimensions to fit inside bell of larger pipe and for spigot of smaller pipe to fit inside ring.

2.8 CLEANOUTS

A. Cast-Iron Cleanouts:

1. Description: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.
2. Top-Loading Classification(s): Heavy Duty and Extra-Heavy Duty.
3. Sewer Pipe Fitting and Riser to Clean out: ASTM A 74, Service class, cast-iron soil pipe and fittings.

2.9 MANHOLES

A. Standard Precast Concrete Manholes:

1. Description: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for sealant joints.
2. Diameter: 48 inches minimum unless otherwise indicated.
3. Ballast: Increase thickness of precast concrete sections or add concrete to base section as required to prevent flotation per engineer’s plans and recommendations.
4. Base Section: 8-inch minimum thickness for floor slab and 5-inch minimum thickness for walls and base riser section, and separate base slab or base section with integral floor.
5. Riser Sections: 5-inch minimum thickness and lengths to provide depth indicated.
6. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated, and top of cone of size that matches grade rings.
7. Joint Sealant: ASTM C 990, bitumen, or butyl rubber.
8. Resilient Pipe Connectors: ASTM C 923, cast or fitted into manhole walls, for each pipe connection.
9. Steps: Individual FRP steps; FRP ladder; or ASTM A 615/A 615M, deformed, 1/2-inch steel reinforcing rods encased in ASTM D 4101, PP, wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 16-inch intervals. Omit steps if total depth from floor of manhole to finished grade is less than 42 inches.
10. Adjusting Rings: Interlocking HDPE rings with level or sloped edge in thickness and diameter matching manhole frame and cover, and of height required to adjust manhole frame and cover to indicated elevation and slope. Include sealant recommended by ring manufacturer.

B. Manhole Frames and Covers:

1. Description: Ferrous; 24-inch ID by 7- to 9-inch riser with 4-inch- minimum width flange and 26-inch- diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to "STORM SEWER."
2. Material: ASTM A 536, Grade 60-40-18 ductile iron unless otherwise indicated.
3. Per local regulatory agencies.

2.10 CONCRETE

A. General: Cast-in-place concrete according to ACI 318, ACI 350/350R, and the following:

1. Cement: ASTM C 150, Type II.
2. Fine Aggregate: ASTM C 33, sand.
3. Coarse Aggregate: ASTM C 33, crushed gravel.
4. Water: Potable.

B. Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio.

1. Reinforcing Fabric: ASTM A 185/A 185M, steel, welded wire fabric, plain.
2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.

C. Manhole Channels and Benches: Factory or field formed from concrete. Portland cement design mix, 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio. Include channels and benches in manholes.

1. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.

    a. Invert Slope: One (1) percent unless noted otherwise on drawings.

2. Benches: Concrete, sloped to drain into channel.

    a. Slope: 4 percent.

D. Ballast and Pipe Supports: Portland cement design mix, 3000 psi minimum, with 0.58 maximum water/cementitious materials ratio.

1. Reinforcing Fabric: ASTM A 185/A 185M, steel, welded wire fabric, plain.
2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.

2.11 CATCH BASINS

A. Standard Precast Concrete Catch Basins:

1. Description: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for sealant joints. Capable of supporting H-20 loading.

2. Base Section: 6-inch minimum thickness for floor slab and 6-inch minimum thickness for walls and base riser section, and separate base slab or base section with integral floor.
3. Riser Sections: 6-inch minimum thickness, 48-inch diameter, and lengths to provide depth indicated.
4. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
5. Joint Sealant: ASTM C 990, bitumen, or butyl rubber.
6. Adjusting Rings: Interlocking rings with level or sloped edge in thickness and shape matching catch basin frame and grate. Include sealant recommended by ring manufacturer.
7. Steps: Individual FRP steps; FRP ladder; or ASTM A 615/A 615M, deformed, 1/2-inch steel reinforcing rods encased in ASTM D 4101, PP, wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 16-inch intervals. Omit steps if total depth from floor of catch basin to finished grade is less than 42 inches.
8. Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to base section.

B. Rectangular Frames and Grates: ASTM A 536, Grade 60-40-18, ductile iron designed for A-16, structural loading. Include flat grate with small square or short-slotted drainage openings.

1. Size: 24 by 24 inches minimum unless otherwise indicated.
2. Grate Free Area: Approximately 50 percent unless otherwise indicated.

C. Round Frames and Grates: ASTM A 536, Grade 60-40-18, ductile iron designed for A-16, structural loading. Include 24-inch ID by 7- to 9-inch riser with 4-inch minimum width flange, and 26-inch- diameter flat grate with small square or short-slotted drainage openings.

1. Grate Free Area: Approximately 50 percent unless otherwise indicated.

2.12 STORMWATER INLETS

A. Curb Inlets: Made with vertical curb opening, of materials and dimensions according to utility standards. No pipe penetrations shall be at inlet corners.

B. Gutter Inlets: Made with horizontal gutter opening, of materials and dimensions according to utility standards. Include heavy-duty frames and grates.

C. Combination Inlets: Made with vertical curb and horizontal gutter openings, of materials and dimensions according to utility standards. Include heavy-duty frames and grates.

D. Frames and Grates: Heavy duty, according to utility standards.

2.13 PIPE OUTLETS

A. Head Walls: Precast and/or Cast-in-place reinforced concrete, with apron and tapered sides. Dimensions and shapes as noted on drawings.

B. Riprap Basins: Broken, irregularly sized and shaped, graded stone according to NSSGA's "Quarried Stone for Erosion and Sediment Control."

1. Average Size: NSSGA (The National Stone, Sand, & Gravel Association) No. R-5, screen opening 5 inches.

C. Filter Stone: According to NSSGA's "Quarried Stone for Erosion and Sediment Control," No. FS-2, No. 4 screen opening, average-size graded stone.

D. Energy Dissipaters: According to NSSGA's "Quarried Stone for Erosion and Sediment Control," No. A-1, 3-ton average weight armor stone, unless otherwise indicated.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavation, trenching, and backfilling are specified in Section 31 20 00 "Earth Moving."

3.2 PIPING INSTALLATION

A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.

B. Bedding of pipe:

1. Pipe shall be laid on undisturbed soil, shaped by hand shovel, to fit the barrel of the pipe at least 90 degrees of arc. If the Contractor cannot or will not comply with this requirement he may, at his own expense, undercut the trench at least 3 inches and use sand or approved stone beneath the pipe and around the pipe to a height over the entire trench bottom that will furnish 90 degrees of arc contact with the barrel of the pipe.
2. Crushed stone, when used for bedding in unstable trenches, shall be to the depth under the pipe as required to provide a stable bedding and to a height around the pipe so as to furnish 90 degree of arc contact with the barrel of the pipe.

C. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Any pipe laid offline and/or grade shall be removed and re-laid if directed, at the expense of the Contractor.

1. The pipe shall be so laid in the trench that after the sewer is completed the invert of the pipe shall conform accurately to line and grade.
2. Prior to being lowered into the trench, each pipe shall be carefully inspected, and all faulty pipes shall be rejected and removed from the work.
3. A bell hole shall be dug for each joint. Bell holes shall be no larger than necessary for making the joint. The bottom of the trench shall be shaped to fit the bottom quarter of the pipe to ensure a firm even bearing on undisturbed earth for the entire length of the pipe.
4. The interior of the bell of the last pipe laid and the spigot of the next pipe shall be wiped clean and dry as each joint is laid.

D. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.

E. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

F. When installing pipe under streets or other obstructions that cannot be excavated, use pipe-jacking process of micro tunneling as approved.

G. Install gravity-flow, nonpressure drainage piping according to the project plans, specifications, and manufacturer’s requirements.

H. Install corrosion-protection piping encasement over the following underground metal piping according to ASTM A 674 or AWWA C105:

1. Hub-and-spigot, cast-iron soil pipe and fittings.
2. Hubless cast-iron soil pipe and fittings.
3. Ductile-iron pipe and fittings.
4. Expansion joints.

3.3 PIPE JOINT CONSTRUCTION

A. Join gravity-flow, nonpressure drainage piping according to the project plans, specifications, and manufacturer’s requirements.

3.4 CLEANOUT INSTALLATION

A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts and cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.

1. Use Light-Duty, top-loading classification cleanouts in earth or unpaved foot-traffic areas.
2. Use Medium-Duty, top-loading classification cleanouts in paved foot-traffic areas.
3. Use Heavy-Duty, top-loading classification cleanouts in vehicle-traffic service areas.
4. Use Extra-Heavy-Duty, top-loading classification cleanouts in roads and loading dock areas.

B. Set cleanout frames and covers in earth in cast-in-place concrete block, 18 by 18 by 12 inches deep. Set with tops 1 inch above surrounding earth grade. Set cleanout frames and covers in concrete pavement and roads with tops flush with pavement surface.

3.5 MANHOLE INSTALLATION

A. General: Install manholes, complete with appurtenances and accessories indicated.

B. Install precast concrete manhole sections with sealants according to ASTM C 891.

C. Where specific manhole construction is not indicated, follow manhole manufacturer's written instructions.

D. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3 inches above finished surface elsewhere unless otherwise indicated.

3.6 CATCH BASIN INSTALLATION

A. Set frames and grates to elevations indicated.

3.7 STORMWATER INLET AND OUTLET INSTALLATION

A. Construct inlet head walls, aprons, and sides of reinforced concrete, as indicated.

B. Construct riprap of broken stone, as indicated.

C. Install outlets that spill onto grade, anchored with concrete, where indicated.

D. Install outlets that spill onto grade, with flared end sections that match pipe, where indicated.

E. Construct energy dissipaters at outlets, as indicated.

3.8 CONCRETE PLACEMENT

A. Place cast-in-place concrete according to ACI 318.

3.9 CHANNEL DRAINAGE SYSTEM INSTALLATION

A. Install with top surfaces of components, except piping, flush with finished surface.

B. Assemble channel sections to form slope down toward drain outlets. Use sealants, adhesives, fasteners, and other materials recommended by system manufacturer.

C. Embed channel sections and drainage specialties in 4-inch minimum concrete around bottom and sides.

D. Fasten grates to channel sections if indicated.

E. Assemble channel sections with flanged or interlocking joints.

F. Embed channel sections in 4-inch minimum concrete around bottom and sides.

3.10 CONNECTIONS

A. Connect nonpressure, gravity-flow drainage piping in building's storm building drains.

B. Make connections to existing piping and underground manholes.

1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye fitting, plus 6-inch overlap, with not less than 6 inches of concrete with 28-day compressive strength of 4000 psi.
2. Make branch connections from side into existing piping, NPS 4 to NPS 20. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye with not less than 6 inches of concrete with 28-day compressive strength of 4000 psi.
3. Make branch connections from side into existing piping, NPS 21 or larger, or to underground manholes and structures by cutting into existing unit and creating an opening large enough to allow 6 inches of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or

structure wall to conform to shape of and be flush with inside wall unless otherwise indicated. On outside of pipe, manhole, or structure wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.

a. Use concrete that will attain a minimum 28-day compressive strength of 4000 psi unless otherwise indicated.
b. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.

4. Protect existing piping, manholes, and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

C. Pipe couplings and expansion joints with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

1. Use nonpressure-type flexible couplings where required to join gravity-flow, nonpressure sewer piping unless otherwise indicated.

a. Shielded flexible couplings for same or minor difference OD pipes.
b. Unshielded, increaser/reducer-pattern, flexible couplings for pipes with different OD.
c. Ring-type flexible couplings for piping of different sizes were annular space between smaller piping's OD and larger piping's ID permits installation.

3.11 IDENTIFICATION

A. Materials and their installation are specified in Section 31 20 00 "Earth Moving." Arrange for installation of green warning tape directly over piping and at outside edge of underground structures.

1. Use warning tape or detectable warning tape over ferrous piping.
2. Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.12 FIELD QUALITY CONTROL

A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.

1. Submit separate reports for each system inspection.
2. Defects requiring correction include the following:

a. Alignment: Less than full diameter of inside of pipe is visible between structures.
b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
d. Infiltration: Water leakage into piping.
e. Exfiltration: Water leakage from or around piping.

3. Replace defective piping using new materials and repeat inspections until defects are within allowances specified.
4. Reinspect and repeat procedure until results are satisfactory.

B. Flushing: Upon completion of the work, the Contractor shall clean and flush out the entire piped storm drainage system including structures.

C. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.

1. Do not enclose, cover, or put into service before inspection and approval.
2. Test completed piping systems according to requirements of authorities having jurisdiction.
3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
4. Submit separate report for each test.
5. Gravity-Flow Storm Drainage Piping: Test according to requirements of authorities having jurisdiction, UNI-B-6, and the following:

a. Exception: Piping with soil tight joints unless required by authorities having jurisdiction.
b. Option: Test plastic piping according to ASTM F 1417.
c. Option: Test concrete piping according to ASTM C 924.

D. Leaks and loss in test pressure constitute defects that must be repaired by the Contractor at no cost to Owner.

E. Replace leaking piping using new materials and repeat testing until leakage is within allowances specified.

END OF SECTION 33 41 00

SECTION 33 46 00 - SUBDRAINAGE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Sub-drainage for foundations and under slab areas.

PART 2 - PRODUCTS

2.1 PERFORATED-WALL PIPES AND FITTINGS

A. Perforated PE Pipe and Fittings: ASTM F 405 or AASHTO M 252, Type CP; corrugated, for coupled joints.

2.2 WATERPROOFING FELTS

A. Material: Comply with ASTM D 226, Type I, asphalt-saturated organic felt.

2.3 GEOTEXTILE FILTER FABRICS

A. Description: Fabric of PP or polyester fibers or combination of both, with flow rate range from 110 to 330 gpm/sq. ft. when tested according to ASTM D 4491.

B. Structure Type: Nonwoven, needle-punched continuous filament.

1. Survivability: AASHTO M 288 Class 2.
2. Styles: Flat and sock.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavating, trenching, and backfilling are specified in Section 31 20 00 "Earth Moving."

3.2 FOUNDATION DRAINAGE INSTALLATION

A. Place impervious fill material on subgrade adjacent to bottom of footing after concrete footing forms have been removed. Place and compact impervious fill to dimensions indicated, but not less than 6 inches deep and 12 inches wide.

B. Lay flat-style geotextile filter fabric in trench and overlap trench sides.

C. Place supporting layer of drainage course over compacted subgrade and geotextile filter fabric, to compacted depth of not less than 4 inches.

D. Encase pipe with sock-style geotextile filter fabric before installing pipe. Connect sock sections with adhesive or tape.

E. Install drainage piping as indicated in Part 3 "Piping Installation" Article for foundation subdrainage.

F. Add drainage course to width of at least 6 inches on side away from wall and to top of pipe to perform tests.

G. After satisfactory testing, cover drainage piping to width of at least 6 inches on side away from footing and above top of pipe to within 12 inches of finish grade.

H. Install drainage course and wrap top of drainage course with flat-style geotextile filter fabric.

I. Place layer of flat-style geotextile filter fabric or waterproofing felt over top of drainage course, overlapping edges at least 4 inches.

J. Place backfill material over compacted drainage course. Place material in loose-depth layers not exceeding 6 inches. Thoroughly compact each layer. Final backfill to finish elevations and slope away from building.

3.3 PIPING INSTALLATION

A. Install piping beginning at low points of system, true to grades and alignment indicated, with unbroken continuity of invert. Bed piping with full bearing in filtering material. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions and other requirements indicated.

1. Foundation Subdrainage: Install piping level and with a minimum cover of 36 inches unless otherwise indicated.
2. Retaining-Wall Subdrainage: When water discharges at end of wall into stormwater piping system, install piping level and with a minimum cover of 36 inches unless otherwise indicated.

3. Lay perforated pipe with perforations down.
4. Excavate recesses in trench bottom for bell ends of pipe. Lay pipe with bells facing upslope and with spigot end entered fully into adjacent bell.

B. Use increasers, reducers, and couplings made for different sizes or materials of pipes and fittings being connected. Reduction of pipe size in direction of flow is prohibited.

C. Install thermoplastic piping according to ASTM D 2321.

3.4 PIPE JOINT CONSTRUCTION

A. Join perforated PE pipe and fittings with couplings according to ASTM D 3212 with loose banded, coupled, or push-on joints.

B. Special Pipe Couplings: Join piping made of different materials and dimensions with special couplings made for this application. Use couplings that are compatible with and fit materials and dimensions of both pipes.

3.5 BACKWATER VALVE INSTALLATION

A. Install horizontal backwater valves in header piping downstream from perforated subdrainage piping where indicated on drawings.

B. Install horizontal backwater valves in piping in manholes or pits were indicated on drawings.

3.6 CLEANOUT INSTALLATION

A. Comply with requirements for cleanouts specified in Section 33 41 00 "Storm Utility Drainage Piping."

B. Cleanouts for Foundation and Retaining-Wall Subdrainage:

1. Install cleanouts from piping to grade. Locate cleanouts at beginning of piping run and at changes in direction. Install fittings so cleanouts open in direction of flow in piping.
2. In vehicular-traffic areas, use NPS 4 (minimum) cast-iron soil pipe and fittings for piping branch fittings and riser extensions to clean out. Set cleanout frames and covers in a cast-in-place concrete anchor, 18 by 18 by 12 inches deep. Set top of cleanout flush with grade.
3. In nonvehicular-traffic areas, use NPS 4 PVC (minimum) pipe and fittings for piping branch fittings and riser extensions to clean out. Set cleanout frames and covers in a cast-in-place concrete anchor, 12 by 12 by 4 inches deep. Set top of cleanout 1 inch above grade.

4. Comply with requirements for concrete specified in Section 03 30 00 "Cast-in-Place Concrete."

C. Cleanouts for Under slab Subdrainage:

1. Install cleanouts and riser extensions from piping to top of slab. Locate cleanouts at beginning of piping run and at changes in direction. Install fittings so cleanouts open in direction of flow in piping.
2. Use NPS 4 (minimum) cast-iron soil pipe and fittings for piping branch fittings and riser extensions to cleanout flush with top of slab.

3.7 CONNECTIONS

A. Comply with requirements for piping specified in Section 33 41 00 "Storm Utility Drainage Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect low elevations of subdrainage system to building's solid-wall-piping storm drainage system.

C. Where required, connect low elevations of foundation subdrainage to stormwater sump pumps.

3.8 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. After installing drainage course to top of piping, test drain piping with water to ensure free flow before backfilling.
2. Remove obstructions, replace damaged components, and repeat test until results are satisfactory.

B. Drain piping will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.9 CLEANING

A. Clear interior of installed piping and structures of dirt and other superfluous material as work progresses. Maintain swab or drag in piping and pull past each joint as it is completed. Place plugs in ends of uncompleted pipe at end of each day or when work stops. Flush all installed pipes at completion of project to ensure all material had been removed and disposed of properly.

END OF SECTION 33 46 00