

Pasco County Fire and Rescue Station No. 12

Holiday, Florida

TECHNICAL SPECIFICATIONS

Volume I

Divisions 1-14 & 31-33

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ARCHITECTURE • PLANNING • INTERIOR DESIGN

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TECHNICAL SPECIFICATIONS

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SECTION 013200 – CONSTRUCTION PROGRESS SCHEDULE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 CONSTRUCTION SCHEDULE

A. Scope

1. Work under this Section shall consist of furnishing a Construction Schedule showing in detail how the contractor plans to execute and coordinate the Work. The Contract Schedule shall be based on and incorporate the Substantial and Final Completion Dates specified in the Owner-Contractor Agreement and shall show the order in which Contractor shall perform the work, projected dates for the start and completion of separable portions of the work, and any other information concerning Contractor's Work scheduling as Owner may request.
2. The Construction Schedule shall be in the form of a bar chart and shall consist of horizontal lines, or bars, plotted along a daily time scale. Each pay item designed in the Contractor's Schedule of Values shall be denominated as a separate activity and represented by a horizontal bar or bars on the chart. The time-scale shall indicate all required Completion Dates as set forth in the Owner-Contractor Agreement. The horizontal bar(s) shall indicate the start and finish dates as well as the total time period of performance for each pay item activity. The Contractor shall arrange the chart so as to show the pay item activities which are necessary to fulfill each and every Completion Date requirement.
3. Each Work item on the bar chart, as well as being correlated to the payment document, shall be broken into reasonable work segments/activities (where practicable) with individual starting and stopping dates. As a minimum, work shall be segmented to demonstrate its relationship to the various Completion Dates, if any. The segmented Work activities shall be cost loaded to show their dollar value as part of the entire pay item. Activity titles shall be self-explanatory; abbreviations shall be shown in the legend.
4. No such schedule shall be considered suitable unless it clearly displays the scheduled completion dates to be the same as the contracted completion dates.
5. Acceptance of the original or subsequently revised schedule(s) shall in no manner imply Owner's or Architect's approval, nor make the Owner's or Architect's obligations any different or greater, nor shall the Contractor be relieved of any of his obligations. The original Construction Schedule shall be based upon the intent to finish the Work to a state of Substantial Completion on the date(s) set forth as the

Contract completion date(s) in the Contract Documents. The Contractor shall not be entitled to any damage claim for delay or extended general conditions based upon any time schedule whose completion date is earlier than the Contract Completion date, no matter what such early completion is labeled by the Contractor (e.g., float time). The Owner and the Contractor mutually agree that the Contractor has no right to finish earlier than the terms of the Contract call for; nor shall the Contractor have any right to deviate from the original schedule by resequencing, by compressing performance time, or other methods to shorten the time to complete the work. The Owner and the Architect shall have the option whether to endeavor to assist the Contractor in any attempt to finish earlier than contracted. Any such voluntary effort to assist shall be at the convenience of the Owner and Architect.

6. The Contractor shall have the option of scheduling an inspection to establish a Substantial Completion date occurring earlier than the date established by the Contract Documents as the Contract Time provided. However, in such event, the earlier Substantial Completion date will be recognized by the Owner only as a matter of convenience to the Contractor and shall not change the date for Contract Time established by the Contract Documents or be otherwise binding on the Owner. Finishing earlier than the Contract Completion Date or finishing of particular portions of the work earlier shall not place obligations on the Owner for actions by the Owner or Architect. Such is deemed to be inconvenient to them and may be a disadvantage to the Owner, and so neither Owner nor the Architect shall have any obligation to accelerate the schedule of the Owner's or Architect's tasks. In no event shall earlier anticipated completion date(s), whether shown on any accelerated Construction Schedule or not, obligate the Owner for payment of any damages or of extended general conditions costs for any reason whatsoever should the Contractor fail to complete the work by such earlier date prior to Contract Completion Date. Should events occur during performance of the Work which would justify the granting to the Contractor an extension of the Contract Time pursuant to the provisions of the General Conditions of the Contract for Construction, the Contractor shall be entitled to receive only such an extension of Contract Time as is determined by the Architect to be due the Contractor, as follows:
 - a. Any time extension shall only be added to the contractually established date for Contract Completion. The architect shall make his recommendation as to time extensions which shall be determined by application of that portion of delay time directly affecting the critical path of the current accepted construction schedule.
 - b. The Owner will not be obligated to grant time extensions nor the Architect obligated to recommend such based on improper scheduling of the Work or failure to meet schedules, if not indisputable and totally the fault of the Architect or Owner.

B. Updates And Revisions

1. The chart shall be updated to show actual progress and the effect of modifications, delays and other events. A second bar for each work item, in a contrasting color or pattern, shall be drawn parallel to the proposed schedule to show actual progress and to forecast future progress. The actual start and stop dates shall be entered, as

well as the actual dates of the Completion events. Updates are to be submitted monthly to the Architect with, and as part of, each payment request.

2. The updated Construction Schedule submitted by Contractor shall not show a completion date later than the Contract Time, subject to any time extensions approved by Owner, provided, however, that if Contractor believes he is entitled to an extension of the Contract under the Contract Documents, Contractor shall submit to the Architect, with each update, a separate schedule analysis (entitled Requested Time Adjustment Schedule) indicating suggested adjustments in the Contract Time which should, in the opinion of the Contractor, be made by time extension, due to changes, delays or conditions occurring during the past month or previously, or which are expected or contemplated by contractor (whether such conditions are excusable under the Contract or are allegedly due to Contractor or Owner fault); this separate schedule, if submitted shall be accompanied or preceded by a formal time extension request as required by the Contract Documents and a detailed narrative justifying the time extension requested. To the extent any time extension requests are pending at the time of any update in the Construction Schedule the Requested Time Adjustment Schedule shall be updated also each month, to reflect any adjustments made by the Contractor in the Construction Schedule, or any time extensions previously granted by Owner, and to reflect actual or expected progress. Neither the Architect nor the Owner shall have any obligation to consider any time extension request unless the requirements of the Contract Documents, and specifically, but not limited to, the requirements set forth in this paragraph, are complied with; and neither the Architect nor the Owner shall be responsible or liable to Contractor for any constructive acceleration due to failure of Owner to grant time extension under the Contract Documents should Contractor fail to substantially comply with the submission requirements and the justification requirements of this Contract for time extensions. Contractor's failure to perform in accordance with the Construction Schedule shall not be excused, nor be chargeable to Owner, nor the Architect because Contractor has submitted time extension requests or the Requested Time Adjustment Schedule.
3. Neither the updating of Contractor's work schedule nor the submission, updating, change or revision of any other report or schedule submitted to Owner by Contractor under this Contract, nor review or non-objection of the Owner or Architect of any such report or schedule shall have the effect of amending or modifying, in any way, the Contractor Completion Dates, or of modifying or limiting in any way Contractor's obligations under this contract.
4. All Contractor's detailed calculations and documents supporting all schedules, reports, and forecasts shall be available to Owner and Architect upon request.
5. Each updated Construction Schedule submitted by Contractor to the Architect shall be accompanied by a narrative report which reflects the following:
 - a. Description of Work accomplished since submission of previous progress schedule;
 - b. Comparison of the actual status of the Work with Contractor's project schedule;

- c. Status of equipment and material deliveries;
- d. Personnel staffing schedule;
- e. Causes of any delays;
- f. Revision of schedules; and
- g. Action proposed to restore schedule.

C. Schedule of Off-site Activities

1. The Contractor shall include in his Construction Schedule all procurement related activities which lead to the delivery of materials to the site in a timely manner. Upon written approval by the Owner, these activities may be submitted as a separate Off-site Activities Schedule, properly correlated to the Construction Schedule. The schedule of off-site activities shall include, but is not limited to, the following:
 - a. Dates for submittals, ordering, manufacturing or fabricating and delivery of equipment and materials. Long lead items requiring more than one month between ordering and delivery to site shall be clearly noted;
 - b. All significant activities to be performed by the Contractor during the fabrication and erection/installation in a Contractor's plant or on a job site, including materials/equipment purchasing, delivery; and
 - c. Contractor drawings and submittals to be prepared and submitted through the Architect for approval.
2. The Contractor shall be solely responsible for expediting the delivery of all materials to be furnished by him so that the construction progress shall be maintained according to the current schedule for the Work.
3. The Architect shall be advised in writing by the Contractor wherever it is anticipated or determined by the Contractor that the delivery date of any material and/or equipment furnished by the Contractor for installation will be later than the delivery dates shown on the schedules, subject to schedule updates.
4. Submittals, equipment orders and similar items are to be treated as schedule activities.

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

Not Applicable

END OF SECTION 013200

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. Related Sections include the following:
 - 1. Division 1 Section "Closeout Procedures" for submitting warranties.
 - 2. Division 1 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
 - 3. Division 1 Section "Operation and Maintenance Data" for submitting operation and maintenance manuals.
 - 4. Divisions 2 through 33 Sections for specific requirements for submittals in those Sections.

1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information that requires Architect's and Contractor's responsive action.
- B. Informational Submittals: Written information that does not require Architect's and Contractor's responsive action. Submittals may be rejected for not complying with requirements.

1.4 SUBMITTAL PROCEDURES

- A. General: Electronic copies of CAD Drawings of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals upon request.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
 1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 3. Resubmittal Review: Allow 15 days for review of each resubmittal.
 4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.
- D. Identification: Place a permanent label or title block on each submittal for identification.
 1. Indicate name of firm or entity that prepared each submittal on label or title block.
 2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
 3. Include the following information on label for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name and address of Architect.
 - d. Name and address of Contractor.
 - e. Name and address of subcontractor.
 - f. Name and address of supplier.
 - g. Name of manufacturer.
 - h. Revise first subparagraph and associated subparagraph below to suit Project and office practice. See Evaluations.
 - i. Number and title of appropriate Specification Section.
 - j. Drawing number and detail references, as appropriate.
 - k. Location(s) where product is to be installed, as appropriate.
 - l. Other necessary identification.
- E. Deviations: Highlight, encircle, or otherwise specifically identify deviations from the Contract Documents on submittals.

F. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return submittals, without review, received from sources other than Contractor.

1. Transmittal Form: Provide locations on form for the following information:

- a. Project name.
- b. Date.
- c. Destination (To:).
- d. Source (From:).
- e. Names of subcontractor, manufacturer, and supplier.
- f. Category and type of submittal.
- g. Submittal purpose and description.
- h. Specification Section number and title.
- i. Drawing number and detail references, as appropriate.
- j. Submittal and transmittal distribution record.
- k. Remarks.
- l. Signature of transmitter.

2. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same label information as related submittal.

G. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.

H. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

1.5 CONTRACTOR'S USE OF ARCHITECT'S CAD FILES

A. General: At Contractor's written request, copies of Architect's CAD files may be provided to Contractor for Contractor's use in connection with Project, subject to the policies of the Architect's subconsultants.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

- A. General: Prepare and submit Action Submittals required by individual Specification Sections.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
 - 1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
 - 2. Mark each copy of each submittal to show which products and options are applicable.
 - 3. Include the following information, as applicable:
 - a. Manufacturer's written recommendations.
 - b. Manufacturer's product specifications.
 - c. Manufacturer's installation instructions.
 - d. Standard color charts.
 - e. Manufacturer's catalog cuts.
 - f. Wiring diagrams showing factory-installed wiring.
 - g. Printed performance curves.
 - h. Operational range diagrams.
 - i. Mill reports.
 - j. Standard product operation and maintenance manuals.
 - k. Compliance with specified referenced standards.
 - l. Testing by recognized testing agency.
 - m. Application of testing agency labels and seals.
 - n. Notation of coordination requirements.
 - 4. Submit Product Data before or concurrent with Samples.
 - 5. Number of Copies: Submit six copies of Product Data, unless otherwise indicated. Architect will return five copies. Mark up and retain one returned copy as a Project Record Document.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal of Architect's CAD Drawings are otherwise permitted.
 - 1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Dimensions.
 - b. Identification of products.
 - c. Fabrication and installation drawings.
 - d. Roughing-in and setting diagrams.
 - e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
 - f. Shopwork manufacturing instructions.

- g. Templates and patterns.
 - h. Schedules.
 - i. Design calculations.
 - j. Compliance with specified standards.
 - k. Notation of coordination requirements.
 - l. Notation of dimensions established by field measurement.
 - m. Relationship to adjoining construction clearly indicated.
 - n. Seal and signature of professional engineer if specified.
 - o. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.
2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 40 inches.
 3. Number of Copies: Submit six opaque copies of each submittal, unless copies are required for operation and maintenance manuals. Submit eight copies where copies are required for operation and maintenance manuals. Architect will retain two copies; remainder will be returned. Mark up and retain one returned copy as a Project Record Shop Drawing.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Generic description of Sample.
 - b. Product name and name of manufacturer.
 - c. Sample source.
 - d. Number and title of appropriate Specification Section.
 3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples not incorporated into the Work are the property of Owner.
 4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit three full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.

5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit three sets of Samples. Architect will retain two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a Project Record Sample.
 - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
- E. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
 1. Name, address, and telephone number of entity performing subcontract or supplying products.
 2. Number and title of related Specification Section(s) covered by subcontract.
 3. Drawing number and detail references, as appropriate, covered by subcontract.
 4. Number of Copies: Submit three copies of subcontractor list, unless otherwise indicated. Architect will return two copies.

2.2 INFORMATIONAL SUBMITTALS

- A. General: Prepare and submit Informational Submittals required by other Specification Sections.
 1. Number of Copies: Submit four copies of each submittal, unless otherwise indicated. Architect will not return copies.
 2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
- B. Contractor's Construction Schedule: Comply with requirements specified in Division 1 Section "Schedules and Reports."
- C. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

- D. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.
- E. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- F. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- G. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- H. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- I. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- J. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- K. Research/Evaluation Reports: Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
 - 1. Name of evaluation organization.
 - 2. Date of evaluation.
 - 3. Time period when report is in effect.
 - 4. Product and manufacturers' names.
 - 5. Description of product.
 - 6. Test procedures and results.
 - 7. Limitations of use.
- L. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- M. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

- N. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements specified in Division 1 Section "Operation and Maintenance Data."
- O. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.
- P. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:
1. Preparation of substrates.
 2. Required substrate tolerances.
 3. Sequence of installation or erection.
 4. Required installation tolerances.
 5. Required adjustments.
 6. Recommendations for cleaning and protection.
- Q. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:
1. Name, address, and telephone number of factory-authorized service representative making report.
 2. Statement on condition of substrates and their acceptability for installation of product.
 3. Statement that products at Project site comply with requirements.
 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 6. Statement whether conditions, products, and installation will affect warranty.
 7. Other required items indicated in individual Specification Sections.
- R. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.
- S. Material Safety Data Sheets (MSDS's):
1. Architect will only review submittals for which MSDS's have been specifically requested. Unrequested MSDS's will be returned without review.

2.3 DELEGATED DESIGN

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

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

- A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken.
- C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

- D. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.
- E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 013300

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the contract, including General and Supplementary Conditions and other Division 1 Specifications Sections, apply to work of this Section.

1.2 SUMMARY

- A. This section specifies certain minimum temporary facilities and temporary utilities to be provided, regardless of methods and means selected for performance of the Work, but not by way of limitation and not assured for compliance with governing regulations. Temporary facilities are defined to exclude tools and construction machines, testing, demolition, alterations, soil borings, mock-ups and similar items.
- B. Costs: Contractor is responsible for costs of materials and labor required to bring temporary electrical power, telephone, and water to the site. The Contractor will bear the cost of electricity and water consumed by the Contractor during construction from Notice-to-Proceed through Substantial Completion. All costs of labor, materials and usage charges for temporary telephone services shall be borne by the Contractor.
- C. Should any impact fees be assessed as a result of this project, they will be paid by the Owner.

1.3 QUALITY ASSURANCE

- A. General: In addition to compliance with governing regulations and rules/recommendations of franchised utility companies, comply with specific requirements indicated and with applicable local industry standards for construction work (published recommendations by local consensus building councils).
- B. ANSI Standards: Comply with applicable provisions of ANSI A10-Series standards on construction safety, including A10.3, A10.4, A10.5, A10.6, A10.7, A.10.8, A10.9, A10.10, A10.11, A10.12, A10.13, A10.14, A10.15, A10.17, A.10.18, A.10.20, and A10.22.
- C. NFPA Code: Comply with NFPA Code 241, Building Construction and Demolition Operations.
- D. Conservation: Install and operate temporary facilities and perform construction activities in a manner which reasonably will be conservative and avoid waste of energy and materials including water.

1.4 JOB CONDITIONS

- A. Establish and initiate use of each temporary facility at time first reasonably required for proper performance of the work. Terminate use and remove facilities at earliest reasonable time, when no longer needed or when permanent facilities have, with authorized use, replaced the need.
- B. Conditions of Use: Install, operate, maintain and protect temporary facilities in a manner and at locations which will be safe, non-hazardous, sanitary and protective of persons and property, and free of deleterious effects.
- C. Temporary Heating and Cooling: Where permanent M/E systems of project cannot be used to provide temporary heating and cooling, provide space conditioning units which are UL labeled and approved. Provide adequate ventilation and thermostatic control.
- D. Humidity Control: Delay work which is indicated to be performed or maintained under controlled humidity conditions, until permanent HVAC system is operable and can be maintained in operation to provide required conditions.
- E. Power Distribution: Provide weatherproof, grounded circuits with ground-fault interruption feature, with proper power characteristics and either permanently wired or plug-in connections as appropriate for intended use. Provide overload protected disconnect switch for each circuit at distribution panel. Space 4-gang convenience outlets (20 amp circuit) so that every portion of work can be reached with 100' extension cord.
 - 1. Where permitted by governing regulations, temporary wiring not exceeding 120 volt 20 amp circuits may be by nonmetallic sheathed cables; otherwise, provided metal conduit or armored cables.
- F. Temporary Lighting: Provide lighting of intensity and quality sufficient for proper and safe performance of the work, and for access thereto.
 - 1. In areas where work is being performed, provide not less than one 200-watt incandescent lamp per 1000 square feet of floor area, when daylighting is not sufficient.
- G. Water Distribution: Minimum 1" pipe size, with 3/4" hose outlets and vacuum breakers, spaced to reach points of use with 100' maximum length of hose. Maintain 3/4" x 100' hose at each outlet, for both general use and incidental fire protection.
 - 1. Protect water distribution from freezing, by drainage, insulation or temporary heating.
- H. Dewatering: Maintain site and construction work free of water accumulation. Do not endanger the work or adjacent properties. Maintain protection against flooding.

1.5 TEMPORARY UTILITY SERVICES

- A. The types of services required include, but not by way of limitation, water, surface drainage, electrical power and telephones. Where possible and reasonable, connect to existing franchised utilities for required services; and comply with service companies recommendations on materials and methods, or engage service companies to install services. Locate and relocate services (as necessary) to minimize interference with construction operations.
1. Power: Connect temporary electrical service to the power source as directed by electric company officials. Provide a meter and disconnect switch at temporary power pole.
 2. Water: Obtain water service from the nearest water main, as permitted by the local water authority. Provide a meter and shut-off valve near connection to the water main.
 3. Telephones: Engage local telephone company to install and maintain two permanent telephone lines in the field office trailer.
 - a. One phone line shall be located in office dedicated for a fax machine. Second phone is for Contractor's general use.
 - b. Contractor shall provide one portable telephone for his superintendent to carry when away from the field office.
 - c. Post listing of operational and emergency telephone numbers at each telephone.
 - d. Contractor shall bear all costs of temporary telephone service from Notice-to-Proceed through Final Completion.

1.6 TEMPORARY SUPPORT FACILITIES

- A. General: Provide whatever facilities and services may be needed to properly support primary construction process and meet compliance requirements and governing regulations. Do not use permanent facilities except as otherwise indicated, and except after time of substantial completion.
- B. Drinking Water: provide cooled water in closed lid dispenser with adequate supply of dispensable cups. Space containers at site so that personnel will travel no more than 300' to reach a dispenser and/or will not have to leave a secured area.
- C. Toilets: Where permitted by governing regulation, provide single-occupant, self-contained units of either chemical aerated recirculation type or combustion type; glass fiber reinforced polyester enclosure; equipped with both urinal and stool fixtures. Supply units with tissue and, where not located near separate wash facilities, supply with wet-type hand towels and waste containers. Locate units so that personnel will travel no more than 300' to reach a unit.
1. Do not use toilet facilities within new buildings.
- D. Waste Materials: collect and containerize daily; remove from site twice weekly.

- E. Rodent and Pest Control: engage an experienced and recognized expert exterminator service, to maintain full control of insects, rodents and other pests, until time of substantial completion.
- F. Contractor's Field Office: Provide and maintain adequate office space for field office personnel plus one spare work station for incidental use by subcontractor=s personnel, suitably finished, furnished, equipped and air conditioned. Also provide and maintain the following:
1. Office Furnishings:
 - a. Reference Board, 36" x 60", minimum
 - b. Plan Rack, 6 set capacity, minimum
 - c. File Cabinet, legal size, 2 drawer minimum
 - d. Side Chairs (2)
 - e. Desk, 30" x 60", minimum
 2. One air conditioned conference area with conference table and eight chairs.
 3. Fax machine, accessible to Owner=s representative.
 4. Plain paper copying machine, accessible to Owner=s representative.
 5. Storage room, separate from office facilities.
- G. Project Identification and Temporary Signs: prepare project identification and other signs of the size indicated; install signs where directed by Architect to inform the public and persons seeking entrance to the Project. Support on posts or framing of preservative treated wood or steel. Do no permit installation of unauthorized signs.
1. Project Identification Signs: Engage an experienced sign painter to apply graphics.
 2. Project identification sign shall be constructed from a 4 foot by 8 foot sheet of 5/8" thick marine plywood supported by 4 inch by 4 inch pressure treated wood posts braced by pressure treated framing lumber and stakes as required to resist wind. Paint all surfaces of sign with two coats of white exterior enamel. Lettering shall be royal blue. Bottom of sign shall be mounted 4'-0" above grade. Submit shop drawings showing sign layout, size and style of lettering, etc., for Architect's approval. The following information shall be included on the project identification sign:

Project: Pasco County Fire and Rescue Station No. 30

Owner: Pasco County, Florida

Architect: FleischmanGarcia Architecture, Tampa, Florida

General Contractor:
 3. Temporary signs: Prepare signs to provide directional information to construction personnel and visitors.

1.7 SECURITY AND PROTECTION

- A. General: Provide facilities and services as necessary to effectively protect project from losses and persons from injury during the course of construction.
- B. Fire Protection: Provide fire extinguishers of types and sizes recommended by NFPA No. 10. Provide Type A extinguishers in Field Offices and for similar exposures; Type ABC in construction areas. Post warning and quick instructions at each extinguisher location, and instruct personnel at project site, at time of their first arrival on proper use of extinguishers and other available facilities at project site. Post local fire department call number on each telephone instrument at project site.
- C. Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate and needed, provide lighting, including flashing red or amber lights.
- D. Enclosure Fence: Before excavation begins, install an enclosure fence with lockable entrance gates. Enclose the entire site or the portion determined sufficient to accommodate construction operations. Install in a manner that will prevent people, dogs, and other animals from easily entering the site, except by the entrance gates.
 - 1. Provide open-mesh, chain link fencing with posts set in a compacted mixture of gravel and earth, 6'-0" high minimum
- E. Security Enclosure and Lockup: Install substantial temporary enclosure of partially completed areas of construction. Provide locking entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.
 - 1. Storage: Where materials and equipment must be stored, and are of value or attractive for theft, provide a secure lockup. Enforce discipline in connection with the installation and release of material to minimize the opportunity for theft and vandalism.
- F. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways, and subsoil might be contaminated or polluted or that other undesirable effects might result. Avoid use of tools and equipment that produce harmful noise. Restrict use of noise-making tools and equipment to hours that will minimize complaints from persons or firms near the site.

1.8 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.
- B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
 2. Protection: Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.
- C. Termination and Removal: Unless the Architect requests that it be maintained longer, remove each temporary facility when the need has ended, when 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 the temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
1. Materials and facilities that constitute temporary facilities are the Contractors property. The Owner reserves the right to take possession of project identification signs.
 2. Remove temporary paving not intended for or acceptable for integration into permanent paving. Where the area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil in the area. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at the temporary entrances, as required by the governing authority.
 3. At Substantial Completion, clean and renovate permanent facilities used during the construction period including, but not limited to, the following:
 - a. Replace air filters and clean inside of ductwork and housings.
 - b. Replace significantly worn parts and parts subject to unusual operating conditions.
 - c. Replace lamps burned out or noticeably dimmed by hours of use.

PART 2 - PRODUCTS NOT APPLICABLE

PART 3 - EXECUTION NOT APPLICABLE

END OF SECTION 015000

SECTION 016000 – PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements governing the Contractor's selection of products for use in the Project.

1.3 DEFINITIONS

- A. Definitions used in this Article are not intended to change the meaning of other terms used in the Contract Documents, such as "specialties," "systems," "structure," "finishes," "accessories," and similar terms. Such terms are self-explanatory and have well-recognized meanings in the construction industry.
 1. "Bidder" is any natural person, partnership, corporation, limited liability company or any other legal entity submitting a bid proposal for the Work.
 2. "Bid Proposal" is the offer or proposal of the Bidder submitted on the prescribed Bid Proposal form setting forth the price(s) for the work to be performed.
 3. "Contractor" is the successful Bidder, whether a natural person, partnership, corporation, limited liability company, or any other legal entity or combination thereof, with whom the Pasco County Board of County Commissioners has entered into the Agreement.
 4. "Equipment" is a product with operational parts, whether motorized or manually operated, that requires service connections, such as wiring or piping.
 5. "Materials" are products substantially shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.
 6. "Products" are items purchased for incorporation in the Work, whether purchased for the Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - a. "Named Products" are items identified by the manufacturer's product name, including make or model number or other designation, shown or listed in the manufacturer's published product literature, that is current as of the date of the Contract Documents.

7. "Substitution" is a product, service, component, or system that is not identical to that delineated in the specifications, but which is proposed by the Contractor in lieu thereof. The acceptability of a substitution shall be based on the data submitted and the benefit to the County, including, but not limited to, appropriate adjustments in price.

1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products according to the manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft.
 1. Schedule delivery to minimize long-term storage at the site and to prevent overcrowding of construction spaces.
 2. Coordinate delivery with installation time to assure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
 3. Deliver products to the site in an undamaged condition in the manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 4. Inspect products upon delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
 5. Store heavy materials away from the Project structure in a manner that will not endanger the supporting construction.
 6. Store products subject to damage by the elements above ground, under cover in a weathertight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION

- A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, new at the time of installation.
 1. Provide products complete with accessories, trim, finish, safety guards, and other devices and details needed for a complete installation and the intended use and effect.

- B. Product Selection Procedures: The Contract Documents and governing regulations govern product selection. Procedures governing product selection include the following:
1. Proprietary Specification Requirements: Where Specifications name only a single product or manufacturer, provide the product indicated.
 2. Semiproprietary Specification Requirements: Where Specifications name 2 or more products or manufacturers, provide 1 of the products indicated.
 3. Or Equal Clause: Where one or more products or manufacturers are specified by name, accompanied by the term or equal, or approved equal, the contractor may make a written request for a substitution of an unnamed product or manufacturer provided such request shall be submitted in writing to the County.
 4. Nonproprietary Specifications: When Specifications list products or manufacturers that are available and may be incorporated in the Work, but do not restrict the Contractor to use of these products only, the Contractor may propose any available product that complies with Contract requirements. Comply with provisions noted herein concerning "substitutions" to obtain approval for use of an unnamed product.
 5. Descriptive Specification Requirements: Where Specifications describe a product or assembly, listing exact characteristics required, with or without use of a brand or trade name, provide a product or assembly that provides the characteristics and otherwise complies with Contract requirements.
 6. Compliance with Standards, Codes, and Regulations: Where Specifications only require compliance with an imposed code, standard, or regulation, select a product that complies with the standards, codes, or regulations specified.
 7. Visual Matching: Where Specifications require matching an established Sample, the Architect's decision will be final on whether a proposed product matches satisfactorily.
 8. Visual Selection: Where specified product requirements include the phrase "... as selected from manufacturer's standard colors, patterns, textures ..." or a similar phrase, select a product and manufacturer that complies with other specified requirements. The Architect will select the color, pattern, and texture from the product line selected.

2.2 SUBSTITUTIONS

- A. Substitutions, General: By submitting a bid, the Bidder represents that its bid is based on materials and equipment described in the Contract Documents, including Addenda. Bidders are encouraged to request approval of qualifying substitute materials and equipment during the bid period when the Specifications Sections list materials and equipment by product or manufacturer name.

- B. Substitution Requests will be received and considered by County when the following conditions are satisfied, as determined by the County and the Architect; otherwise requests will be returned without action:
1. Extensive revisions to the Contract Documents are not required.
 2. Proposed changes are in keeping with the general intent of the Contract Documents, including the level of quality of the Work represented by the requirements therein.
 3. The proposed substitution does not affect dimensions and functional clearances.
 4. The request is fully documented and properly submitted.
- C. The burden of proof that the product proposed by the Bidder is in fact equal to that referenced in the Contract Documents **lies exclusively with the Bidder**. In the event that either County staff or the Architect determines that the equal proposed by the Bidder does not meet the specifications, the successful Bidder shall be required to provide the named product item, or an equal acceptable to the County, at no additional cost to the County.
1. Substitution requests shall only be made by prime Bidders or Contractors as defined herein. Requests made directly by manufacturers, vendors, product distributors, or subcontractors will not be considered.

2.3 REQUESTS FOR SUBSTITUTIONS

- A. Submittal Format: Submit three copies of each written Substitution Request including the following information:
1. Identify the product or the fabrication or installation method to be replaced in each request. Include related Specifications Sections and drawing numbers.
 2. Provide complete documentation on both the product specified and the proposed substitute, including the following information as appropriate:
 - a. Point-by-point comparison of specified and proposed substitute product data, fabrication drawings, and installation procedures.
 - b. Copies of current, independent third-party test data of salient product or system characteristics.
 - c. Samples where applicable or when requested by Architect.
 - d. Detailed comparison of significant qualities of the proposed substitute with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
 - e. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.

- f. Research reports, where applicable, evidencing compliance with the Florida Building Code.
 - g. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by the County and separate contractors, which will become necessary to accommodate the proposed substitute.
- B. Provide certification by manufacturer that the substitute proposed is equal to or superior to that required by the Contract Documents, and that its in-place performance will be equal to or superior to the product or equipment specified in the application indicated.
- C. Bidder/Contractor, in submitting the Substitution Request, waives the right to additional payment or an extension of Contract Time because of the failure of the substitute to perform as represented in the Substitution Request.
- D. Architect's/County's approval of a substitute during bidding does not relieve Contractor of the responsibility to submit required shop drawings and to comply with all other requirements of the Contract Documents.
- E. Shop drawings, product data, or samples submitted for substitute products will not be reviewed unless accompanied by the written Substitution Request described above.

PART 3 - EXECUTION

3.1 INSTALLATION OF PRODUCTS

- A. Comply with manufacturer's instructions and recommendations for installation of products in the applications indicated. Anchor each product securely in place, accurately located and aligned with other Work.
- 1. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

END OF SECTION 016000

SECTION 017000 – CIVIL TECHNICAL SPECIAL PROVISIONS

PART 1 – GENERAL

The Civil Technical Special Provisions (Section 017000) shall only pertain to Division 31, 32, and 33 of the Technical Specifications.

The Definition of Terms set forth below are complementary to Part II Conditions of the Contract, A. General Conditions – Article 2 Definitions.

1.1 DEFINITION OF CIVIL ENGINEERING TERMS

1. CONTRACT: The CONTRACT DOCUMENTS as defined in the General Conditions.
2. CONTRACTOR: The CONTRACTOR as defined in the General Conditions
3. CONTRACT TIME: The CONTRACT TIME as defined in the General Conditions.
4. DRAWINGS/PLAN(S): The approved PLANS, including reproductions thereof, showing the location, character, dimensions, and details of the WORK to be done.
5. ENGINEER: The COUNTY ENGINEER as defined in the General Conditions.
6. EQUIPMENT: The machinery and EQUIPMENT, together with the necessary supplies for upkeep and maintenance thereof; also, the tools and all other apparatus necessary, for the construction and acceptable completion of the WORK.
7. MATERIALS: Any substances to be incorporated in the WORK under the CONTRACT.
8. OWNER: The COUNTY as defined in the General Conditions.
9. PROJECT: The PROJECT as defined in the General Conditions.
10. UTILITY: Public or private fixed works for the transportation of fluids, gases, power, signals, or communications. A service connection is a pipe, cable wire, duct, or conduit that is intended to connect a facility with a user.
11. WORK: The WORK as defined in the General Conditions.

1.2 REFERENCE DOCUMENTS

Reference Documents: The following documents are intended to be complementary to and together with other CONTRACT Documents, which describe the construction to be carried out.

1. **Pasco County Engineering Services Department “Testing Specifications for Construction of Roads, Storm Drainage and Utilities”, 2006.**
2. **Florida Department of Transportation “Standard Specifications for Road and Bridge Construction”, 2010.**
3. **Florida Department of Transportation “Roadway and Traffic Design Standards, 2012-2013.**
4. **Federal Highway Administration Manual on Uniform Traffic Control Devices (MUTCD), 2009.**
5. **Florida Department of Transportation “Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways” 2011.**

Coordination of These Documents: The articles contained in the Technical Specifications, the construction drawings, and the above-referenced documents are intended to be complementary and fully describe the technical aspects of the PROJECT. Should there be any conflicts or omissions in the documents, they shall be brought to the attention of the ENGINEER in writing for resolution.

1.3 ITEMS OF WORK AND SITE INVESTIGATION

The principal items of WORK and quantities shown in the DRAWINGS are approximate and are furnished for the sole purpose of showing the approximate scope of WORK to be performed by the CONTRACTOR.

It is the CONTRACTOR'S responsibility to prepare his own estimation of the amount of WORK to be performed. No claim shall be made against the OWNER or ENGINEER for any errors or omissions in the items of WORK or quantities.

The principal items of WORK and quantities shown in the DRAWINGS shall be used for bidding purposes and to establish a basis of payment for items added or deleted by Change Order.

1.4 OSHA REGULATIONS

The CONTRACTOR will strictly comply with all current OSHA rules and regulations and will indemnify the OWNER and ENGINEER from any claims due to his failure to stringently adhere to same.

1.5 ACCESS TO WORK SITE

The CONTRACTOR shall make every effort to limit the use of County/City streets and roads. All EQUIPMENT when not in use and employee vehicles shall be parked on the WORK site. No parking will be allowed on County/City streets and roads.

1.6 AS-BUILT DELIVERABLES

- A. Deliverables: The CONTRACTOR shall deliver to the ENGINEER, prior to final acceptance or final payment, four (4) sets of blue line "As-Built" Drawings signed and sealed by a Florida Registered Land Surveyor, and one (1) set of reproducible "As-Built" Drawings (ink on mylar) which will bear the name and registration number of the CONTRACTOR'S surveyor as well as the surveyor's company name and address.
1. The "As-Built" Drawings shall be plotted on the Plan and Profile sheets, the Drainage Structure sheets, and the appropriate detail sheets. "As-Built" information shall be plotted in ink so that it is easily distinguished from the "proposed" (i.e., boldly and denoted as "As-Built").
- B. The following information, at a minimum, shall be verified on the as-built drawings, and supplemental documents if needed:
1. Discharge structures - Locations, dimensions and elevations of all, including weirs, orifices, gates, pumps, pipes, and oil and grease skimmers;
 2. Side bank and underdrain filters, or exfiltration trenches - locations, dimensions and elevations of all, including clean-outs, pipes, connections to control structures and points of discharge to receiving waters;
 3. Storage areas for treatment and attenuation - dimensions, elevations, contours or cross-sections of all, sufficient to determine stage-storage relationships of the storage area and the permanent pool depth and volume below the control elevation for normally wet systems;
 4. System grading - dimensions, elevations, contours, final grades or cross-sections to determine contributing drainage areas, flow directions and conveyance of runoff to the system discharge point(s);
 5. Conveyance - dimensions, elevations, contours, final grades or cross-sections of systems utilized to divert off-site runoff around or through the new system;
 6. Water levels - existing water elevation(s) and the date determined;
 7. Benchmark(s) - location and description (minimum of one per major water control structure); and
 8. Wetland mitigation or restoration areas - Show the plan view of all areas, depicting a spatial distribution of plantings conducted by zone (if plantings are required by permit), with a list showing all species planted in each zone, numbers of each species, sizes, date(s) planted and identification of source of MATERIAL; also provide the dimensions, elevations, contours and representative cross-sections depicting the construction.
 9. Any additional information shall be shown on the as-built survey to verify construction.

- C. Maintenance of "As-Built" Drawings: It is the OWNER'S intent that the "As-Built" Drawings shall be initiated at the notice to proceed and shall be kept reasonably up to date throughout the CONTRACT TIME.
- D. Any costs for maintaining of "as-built" records and preparing the drawings shall be the responsibility of the CONTRACTOR and shall be incidental to the CONTRACT.

1.7 MATERIAL TESTING

All MATERIAL testing shall be in accordance with the **Pasco County Engineering Services Department "Testing Specifications for Construction of Roads, Storm Drainage and Utilities"**, 2006. All testing shall be at the expense of the CONTRACTOR.

A. Time Frames for Reporting Test Results:

1. The CONTRACTOR'S testing laboratory shall provide a field report, summarizing samples made or taken and on-site tests performed and the results. This report shall be neat and legible and bear the name of the testing laboratory. Reports submitted on inappropriate MATERIALS will not be accepted.
2. The CONTRACTOR shall deliver two (2) certified copies of test result reports, to the ENGINEER, within ten (10) calendar days of performance of the test or taking a sample of the MATERIAL to be tested, whichever occurred first. This time frame shall be accepted with respect to concrete compression cylinders. Failure to submit field reports or to produce certified reports within the specified time frame will allow the ENGINEER to withhold approval of any partial pay request under consideration or to suspend the WORK.

B. Formats for Reporting Test Results:

1. Certified test reports shall prominently display at the top of the report **Pasco County Fire & Rescue Station No. 30**. An individual test report will not combine test results for different items of WORK or the results of different types of test for the same item of WORK, unless deemed appropriate and approved by the ENGINEER. Each report shall be uniquely identified using a code for the item of WORK tested and the type of test performed, and numerically ordered by date.
2. The certified reports shall contain all information as required by the specific testing specification, i.e., AASHTO, ASTM, etc., as well as location or depth, conditions, and other appropriate information. Once implemented, the certified test reports' identification/numbering system and formats shall be maintained through the life of the PROJECT.

PART 2 – EXECUTION

2.1 MOBILIZATION

- A. The WORK specified for mobilization consists of the preparatory WORK and operations in mobilizing for beginning WORK on the PROJECT and the operations for ending WORK on the PROJECT. The WORK will include, but not be limited to, those operations necessary for the movement of personnel, EQUIPMENT, supplies, and incidentals to and from (at the end)

the PROJECT site, and for the establishment of temporary offices, buildings, safety EQUIPMENT, and first aid supplies, sanitary and other facilities. The cost of bonds and insurance, and any other preconstruction expense necessary for the start of the WORK, excluding the cost of construction MATERIALS, shall be included. The cost of final cleanup and demobilization shall be included.

- B. Any costs associated with Mobilization shall be included in the CONTRACT Lump Sum Price for Mobilization.

2.2 MAINTENANCE OF TRAFFIC

- A. The WORK specified in this section consists of maintaining traffic within the limits of the PROJECT for the duration of the construction period, including any temporary suspensions of the WORK. It shall include the construction and maintenance of any necessary detour facilities; the furnishing, installing, and maintaining of traffic control and safety devices during construction; the control of dust, and any other special requirements for safe and expeditious movement of traffic as may be called for on the PLANS. The term, Maintenance of Traffic, shall include all of such facilities, devices, and operations as are required for the safety and convenience of the public as well as for minimizing public nuisance all as specified in this section.
- B. It shall be the CONTRACTOR'S responsibility to determine sections of the PROJECT where maintenance of Traffic is required. The CONTRACTOR shall provide safe pedestrian and vehicle access through the PROJECT at all times during construction.
- C. Sections not Requiring Traffic Maintenance: In general, the CONTRACTOR will not be required to maintain traffic over those portions of the PROJECT where no WORK is to be accomplished or where construction operations will not affect existing roads. The CONTRACTOR, however, shall not obstruct nor create a hazard to any traffic during the prosecution of the WORK and shall be responsible for repair of any damage to existing pavement or facilities caused by such operations.
- D. The CONTRACTOR'S responsibility for maintenance of traffic shall begin on the day he/she starts WORK on the PROJECT.
- E. Traffic Control Devices: Any and all traffic control devices installed on the County or State road system shall conform to **Florida State Statute 316.0745, Uniform Signals and devices**. F.S. 316.0745 requires that all devices conform to the Florida Department of Transportation (FDOT) specifications. The FDOT has adopted the Federal Manual on Uniform Traffic Control Devices as the standards to be used in the State of Florida.
- F. The CONTRACTOR shall present his/her Maintenance of Traffic PLAN at the Preconstruction Conference.
- G. In no case may the CONTRACTOR begin WORK until the Maintenance of Traffic PLAN has been approved in writing by the ENGINEER. Modifications to the Maintenance of Traffic PLAN that become necessary shall also be approved in writing. Except in an emergency, no changes to the approved PLAN will be allowed until the approval to such changes to the PLAN has been received.
- H. The cost of all WORK included in the Maintenance of Traffic PLAN shall be included in the

pay item for "Maintenance of Traffic".

2.3 PIPE TRENCH EXCAVATION:

- A. Trenches for any pipe including, but not limited to, culverts and storm sewers, shall be excavated to the required depth and to a width sufficient to provide adequate working room.
- B. The CONTRACTOR(S) performing trench excavation on this CONTRACT, in excess of five (5) feet in depth, shall comply with the Occupational Safety and Health Administration's (OSHA) trench excavation safety standards, 29 C.F.R., section 1926.650, Subpart P, including all subsequent revisions or updates to these standards as adopted by the Department of Labor and Employment Security (DLES).
- C. The CONTRACTOR shall consider all available geotechnical information in his/her design of the trench excavation safety system.
- D. The CONTRACTOR(S) performing trench excavation shall adhere to OSHA trench excavation safety standards and special shoring requirements for trench excavation, if any, of the State or other political subdivisions. Inspections required by OSHA trench excavation safety standards shall be provided by the CONTRACTOR.

2.4 CONSTRUCTION SURVEY:

The CONTRACTOR shall be required to obtain a registered land surveyor, licensed in the State of Florida to provide required survey construction staking and as-built information. All costs associated with construction survey shall be included in the CONTRACT unit cost for the appropriate bid item in which a survey is required or as outlined within the CONTRACT documents.

2.5 UTILITY LOCATION CONFIRMATION:

The CONTRACTOR shall verify the horizontal and vertical location of any UTILITIES within the PROJECT area at locations designated by the ENGINEER. The CONTRACTOR shall excavate around each UTILITY by hand digging and shall use due care to protect each UTILITY. UTILITY locations will be verified where excavation shall occur over existing UTILITIES with sufficient frequency along the length of the PROJECT to avoid potential conflicts or as directed by the ENGINEER. Any UTILITIES damaged by the CONTRACTOR shall be repaired at the CONTRACTOR'S expense. The CONTRACTOR shall notify each UTILITY company prior to excavation around the UTILITY.

The intent of this WORK is to determine the accuracy of the UTILITY location information provided to the OWNER by the UTILITY companies, and to further evaluate the potential of UTILITY conflicts with proposed construction at the start to the construction phase. All costs associated with this WORK shall be included in the lump sum amount for "Mobilization".

2.6 PROTECTION OF EXISTING IMPROVEMENTS:

The CONTRACTOR shall provide protection necessary to prevent damage to existing improvements within the PROJECT area indicated to remain in place or on adjacent properties. Areas that are damaged during construction by the CONTRACTOR shall be restored to their original condition and/or as acceptable to the ENGINEER.

2.7 PROTECTION OF EXISTING TREES AND VEGETATION:

The CONTRACTOR shall protect existing trees and other vegetation indicated to remain in place, against unnecessary cutting, breaking, or skinning of roots, skinning and bruising of bark, smothering of trees by stockpiling construction MATERIALS or excavating MATERIALS within drip line, excess foot or vehicular traffic, or parking of vehicles within drip line. Where trees and vegetation indicated to remain are damaged by construction operations, the CONTRACTOR shall employ a licensed arborist to repair damages to trees and shrubs in a manner acceptable to the ENGINEER.

2.8 NPDES:

The sediment control/erosion control measures outlined with the construction drawings are considered to be the minimum requirements for preventing sediment from leaving the PROJECT site onto adjacent properties. It shall be the CONTRACTORS responsibility to maintain all the sediment/erosion control devices in good working order and to furnish and install additional control measures to prevent sediment from leaving the PROJECT site as required. Costs for additional measures shall be approved in advance by Pasco County and covered under the unit costs for: sediment barrier (silt fence), Excavation, and Sodding (Bahia).

2.9 PERMITS:

Compliance: The CONTRACTOR shall familiarize himself/herself with all regulatory permits associated with the PROJECT. The CONTRACTOR shall make himself/herself familiar with all the permits and PLAN conditions as contained in these Specifications, and shall be wholly and singularly responsible for compliance with the conditions and terms contained therein. The CONTRACTOR shall further hold the OWNER and ENGINEER harmless for all consequences resulting from any lack of compliance to the permit conditions. Costs for maintenance and compliance with agency permit requirements shall be considered incidental to the contract and covered under appropriate bid items as determined by the contractor.

END OF SECTION 017000

SECTION 017700 – CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplemental Conditions and other Division 1 Specifications sections, apply to work of this section.

1.2 PROJECT/WORK IDENTIFICATION

- A. This section specifies administrative and procedural requirements for project closeout, including but not limited to:
 - 1. Inspection procedures.
 - 2. Project record document submittal.
 - 3. Operating and maintenance manual submittal.
 - 4. Submittal of warranties.
 - 5. Final cleaning.
- B. Closeout requirements for specific construction activities are included in the appropriate Sections in Divisions 2 - through 33.

1.3 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for certification of Substantial Completion, complete the following. List exceptions in the request.
 - 1. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the work claimed as substantially complete. Include supporting documentation for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Sum.
 - 2. If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.
 - 3. Advise Owner of pending insurance and utility change-over requirements.
 - 4. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications and similar documents specifically required in each section of the specifications.
 - 5. Submit record drawings and Operation and Maintenance Manuals and Project Closeout Manuals in proposed form at Substantial Completion.
 - a. Refer to Section 017823 – Operation and Maintenance Data for quantities of O&M manuals to be submitted.
 - 6. Deliver tools, spare parts, extra stock, and similar items.

7. Make final change-over of permanent locks and transmit keys to the Owner. Advise the Owner's personnel of change-over in security provisions.
8. Complete start-up testing of systems, and instruction of the Owner's operating and maintenance personnel at least 7 calendar days prior to substantial completion. Discontinue or change over and remove temporary facilities from the site, along with construction tools, mock-ups, and similar elements.
9. Prepare and submit contractor's punch list at least 7 calendar days prior to substantial completion.
 - a. Architect and Owner will subsequently prepare punch lists supplementing Contractor's punch list.
10. Submit all required permits, certifications and final approvals for site utility installations.
11. Complete final clean-up requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finishes. Clear and remove all site debris for Owner's safe and full utilization of site except for items required to achieve final completion.

B. Inspection Procedures: On receipt of a request for inspection, the Architect will either proceed with inspection or advise the Contractor of unfilled requirement. The Architect will prepare the Certificate of Substantial Completion on A.I.A. Form G704 following inspection, or advise the Contractor of construction that must be completed or corrected and reinspected before the certificate will be issued.

1. The Architect will repeat inspection when requested and assured that the Work has been substantially completed. Contractor, by means of a Change Order, shall bear cost of Architect's reinspection, including labor and expenses as follows:
 - Registered Professional - \$195/hour
 - Construction Inspector/Project Manager - \$135/hour
 - Secretarial time - \$55/hour
 - Mileage, round trip - \$.56/mile; tolls at cost
 - Copies - \$.20/each
2. Results of the completed inspection will form the basis of requirements for final acceptance.

1.4 FINAL INSPECTION

A. When Contractor considers the Work has reached final completion, he shall submit:

1. Written certification that:
 - a. Contract Documents have been reviewed.
 - b. Work has been inspected for compliance with Contract Documents.
 - c. Work has been completed in accordance with Contract Documents.
 - d. Equipment and systems have been tested in the presence of the Owner's representative and are operational.
 - e. Work is completed and ready for final inspection.

- 2. Revised Operation and Maintenance Manual(s) and project Closeout Manuals in final form five days prior to Final Inspection.
 - a. Refer to Section 017823 – Operation and Maintenance Data for quantities of O&M manuals to be submitted.
- B. Architect will make an inspection to verify the status of completion with reasonable promptness after receipt of such certification.
- C. Should Architect consider that the Work is incomplete or defective:
 - 1. Architect will promptly notify the Contractor in writing, listing the incomplete or defective Work.
 - 2. Contractor shall take immediate steps to remedy the stated deficiencies, and send a second written certification to Architect that the Work is complete.
 - 3. Inspection will be repeated. Contractor shall bear cost of Architect=s reinspection, including labor and expenses as set forth in paragraph 1.3.B.1.
- D. When the Architect finds that the work is acceptable under the Contract Documents, he shall request the Contractor to make closeout submittals.

1.5 PROJECT CLOSEOUT MANUALS

- A. Collect, identify and collate the following materials from the subcontractors to be bound in a hard cover, 3-ring "D" style lay flat binder. Deliver two copies of the finished manuals to the Architect, for delivery to the Owner for approval, as a condition precedent to final certification of payment.
- B. Indexing: Information shall be provided as follows. The individual entries are to be organized and indexed per the specification Table of Contents.
- C. Listing of Contractor and Subcontractors: Provide a listing of subcontractors performing work, both on and off site, with the Contractor heading the list. Required information shall include the following: (Example)

Division 1

Contractor	DBPR License Number
Company Name	Representative’s Name and Title
Address	Phone Number

Division 2

Termite Control	DBPR License Number
Company Name	Representative’s Name and Title
Address	Phone Number

- D. Certificate of Substantial Completion: Insert, at this point, a copy of the fully executed Certificate of Substantial Completion, AIA document G704, as future reference for Owner.

- E. Testing, Inspections and Certificate of Occupancy: Provide copies of tests, and test and balance reports. See Divisions 21 - 28. Provide copies of Certificates of Inspections from authorities having jurisdiction for each trade, division or portion of work, as required. Provide a copy of the final executed Certificate of Occupancy.
 - F. Contractor's Affidavit of Payment of Debts and Claims: Provide certification, on AIA Document G706 that work covered by Contract Documents has been completed, and that payrolls, bills of materials and other indebtedness connected with the Work for which the owner or his property might in any way be responsible, have been paid or otherwise satisfied.
 - G. Contractor's Affidavit of Release of Liens: Provide certification, on AIA Document G706A, that liens that are or may be filed arising from work covered by Contract Documents have been released or waived, with any exception noted. Provide additional certification from subcontractors, and material and equipment suppliers, with any exceptions noted. Provide a bond satisfactory to cover exceptions.
 - H. Lien Waivers: Provide releases and waivers of liens, from the Contractor and Subcontractors as supporting documents to AIA Document G706A.
 - I. Consent of Surety: Provide a Consent of Surety to Final Payment, on AIA Document G707.
 - J. Warranties, Guarantees, and Bonds: Provide warranties, guarantees, and bonds called for in the Contract Documents.
 - K. Certificate of Insurance for Products and Completed Operations.
 - L. Cover: Identify each binder with typed or printed title PROJECT CLOSEOUT MANUAL; and list title of project.
- 1.6 CONTRACTOR'S CLOSEOUT SUBMITTALS TO ARCHITECT
- A. Project Closeout Manuals, as identified herein.
 - B. Project Record Documents, as identified in Section 017839.
 - C. Keys and Keying Schedule, as identified in Section 087100 - Door Hardware.
- 1.7 FINAL APPLICATION FOR PAYMENT
- A. Submit the final Application for Payment in accordance with procedures and requirements stated in the Conditions of the Contract.

PART 2 - PRODUCTS NOT APPLICABLE

PART 3 - EXECUTION

3.1 CLOSEOUT PROCEDURES

- A. Operating and Maintenance Instructions: Prior to Substantial Completion, arrange for each installer of equipment that requires regular maintenance to meet with the Owner's personnel to provide instruction in proper operation and maintenance. If installers are not experienced in procedures, provide instruction by manufacturer's representatives. Include a detailed review of the following items:

1. Maintenance manuals.
2. Record documents.
3. Spare parts and materials.
4. Tools.
5. Lubricants.
6. Fuels.
7. Identification systems.
8. Control sequences.
9. Hazards.
10. Cleaning.
11. Warranties and bonds.
12. Maintenance agreements and similar continuing commitments.

- B. As part of instruction for operating equipment, demonstrate the following procedures.

1. Start-up.
2. Shutdown.
3. Emergency operations.
4. Noise and vibration adjustments.
5. Safety procedures.
6. Economy and efficiency adjustments.
7. Effective energy utilization.

3.2 FINAL CLEANING

- A. General: General cleaning during construction is required by the General Conditions.

- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Comply with manufacturers' instructions.

1. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion.
 - a. Remove labels that are not permanent labels.
 - b. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compound and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.

- c. Clean exposed exterior and interior hard surfaced finishes to a dust-free condition, free of stains, films and similar foreign substances. Restore reflective surfaces to their original reflective condition. Leave concrete floors broom clean. Vacuum carpeted surfaces.
 - d. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps.
 - e. Clean the site, including landscape development areas, of rubbish, litter and other foreign substances. Sweep paved areas clean; remove stains, spills and other foreign deposits. Rake grounds that are neither paved nor planted, to a smooth even textured surface.
- C. Removal of Protection: Remove temporary protection and facilities installed for protection of the Work during construction.
- D. Compliance; comply with regulations of authorities having jurisdiction and safety standards of cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful or dangerous materials into drainage systems. Remove waste materials from the site and dispose of a in a lawful manner.
- E. Where extra materials of value remaining after completion of associated Work have become the Owner's property, arrange for disposition of these materials as directed.

END OF SECTION 017700

SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Operation and maintenance documentation directory.
 - 2. Emergency manuals.
 - 3. Operation manuals for systems, subsystems, and equipment.
 - 4. Maintenance manuals for the care and maintenance of products, materials, finishes, systems, and equipment.
- B. Related Sections include the following:
 - 1. Division 1 Section "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
 - 2. Division 1 Section "Closeout Procedures" for submitting operation and maintenance manuals.
 - 3. Division 1 Section "Project Record Documents" for preparing Record Drawings for operation and maintenance manuals.
 - 4. Divisions 2 through 33 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

1.3 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 SUBMITTALS

- A. Initial Submittal: Submit 2 draft copies of each manual at least 15 days before requesting inspection for Substantial Completion, except as noted below. Include a complete operation and maintenance directory. Architect will return one copy of draft and mark whether general scope and content of manual are acceptable.

1. HVAC-related O&M manuals are highly time-critical due to HVAC System Commissioning requirements. Comply with the following schedule:
 - a. Draft copies of O&M manuals shall be submitted no later than 120 days prior to Substantial Completion.
 - b. Final submittal review copies shall be submitted no later than 60 days prior to Substantial Completion.
 - c. Final, fully corrected manuals must be submitted no later than 15 days prior to Substantial Completion.
- B. Final Submittal: Submit one copy of each manual in final form at least 30 days before final inspection. Architect will return copy with comments within 15 days before final inspection.
 1. Correct or modify each manual to comply with Architect's comments. Submit three copies (except HVAC system manuals) of each corrected manual within 15 days of receipt of Architect's comments. Submit four corrected, final copies of HVAC systems manual.

1.5 COORDINATION

- A. Where operation and maintenance documentation includes information on installations by more than one factory-authorized service representative, assemble and coordinate information furnished by representatives and prepare manuals.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

- A. Organization: Include a section in the directory for each of the following:
 1. List of documents.
 2. List of systems.
 3. List of equipment.
 4. Table of contents.
- B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
- C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
- D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 MANUALS, GENERAL

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
 - 1. Title page.
 - 2. Table of contents.
 - 3. Manual contents.
- B. Title Page: Enclose title page in transparent plastic sleeve. Include the following information:
 - 1. Subject matter included in manual.
 - 2. Name and address of Project.
 - 3. Name and address of Owner.
 - 4. Date of submittal.
 - 5. Name, address, and telephone number of Contractor.
 - 6. Name and address of Architect.
 - 7. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
 - 1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
 - 1. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

- a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
 - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.
2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
 3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software CD's for computerized electronic equipment.
 4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
 5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
 - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
 - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 EMERGENCY MANUALS

- A. Content: Organize manual into a separate section for each of the following:
 1. Type of emergency.
 2. Emergency instructions.
 3. Emergency procedures.
- B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
 1. Fire.
 2. Flood.
 3. Water leak.
 4. Power failure.
 5. Water outage.
 6. System, subsystem, or equipment failure.
 7. Chemical release or spill.
- C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

D. Emergency Procedures: Include the following, as applicable:

1. Instructions on stopping.
2. Shutdown instructions for each type of emergency.
3. Operating instructions for conditions outside normal operating limits.
4. Required sequences for electric or electronic systems.
5. Special operating instructions and procedures.

2.4 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. System, subsystem, and equipment descriptions.
2. Performance and design criteria if Contractor is delegated design responsibility.
3. Operating standards.
4. Operating procedures.
5. Operating logs.

6. Wiring diagrams.
7. Control diagrams.
8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:

1. Product name and model number.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

- D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.5 PRODUCT MAINTENANCE MANUAL

- A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
- C. Product Information: Include the following, as applicable:
 - 1. Product name and model number.
 - 2. Manufacturer's name.
 - 3. Color, pattern, and texture.
 - 4. Material and chemical composition.
 - 5. Reordering information for specially manufactured products.
- D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
 - 1. Inspection procedures.
 - 2. Types of cleaning agents to be used and methods of cleaning.
 - 3. List of cleaning agents and methods of cleaning detrimental to product.
 - 4. Schedule for routine cleaning and maintenance.
 - 5. Repair instructions.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - 1. Include procedures to follow and required notifications for warranty claims.

2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUAL

- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

- B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
1. Standard printed maintenance instructions and bulletins.
 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 3. Identification and nomenclature of parts and components.
 4. List of items recommended to be stocked as spare parts.
- D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
1. Test and inspection instructions.
 2. Troubleshooting guide.
 3. Precautions against improper maintenance.
 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 5. Aligning, adjusting, and checking instructions.
 6. Demonstration and training videotape, if available.
- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

- A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.
- B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
 - 1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 - 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
 - 1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
- F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in Record Drawings to ensure correct illustration of completed installation.
 - 1. Do not use original Project Record Documents as part of operation and maintenance manuals.
 - 2. Comply with requirements of newly prepared Record Drawings in Division 1 Section "Project Record Documents."
- G. Comply with Division 1 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 017823

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Definitions: Record documents are defined to include those documents or copies relating directly to performance of the work, which Contractor is required to prepare or maintain for Owner's records, recording the work as actually performed. In particular, record documents show changes in the work in relation to that which is shown and specified by original contract documents; and show additional information of value to Owner's records, but indicated by original contract documents. Record documents include marked up copies of contract drawings, shop drawings, specifications, addenda and change orders, marked up product data submittals, record samples, and field records for variable and concealed conditions.

1.3 RECORD DRAWINGS

- A. Mark-up procedure: During progress of the work, maintain a white-print set (blueline or blackline) of contract drawings and notations of actual installations which vary substantially from the work as originally shown. Mark whatever drawing is most capable of showing actual physical condition, fully and accurately. Give particular attention to information on work concealed, which would be difficult to identify or measure and record at a later date. Note alternate numbers, change order numbers and similar identification. Label each sheet Project Record in 2 inch high letters.
 - 1. Update project record prints as variations arise. Review progress of updates with Architect at each monthly application for payment review meeting to confirm that record prints are up-to-date. Architect may decline to certify contractor's application for payment if record drawings have not been updated.
 - 2. In preparation for certification of substantial completion on last major portion of the work, review completed mark up of record drawings with Architect. Architect may decline to certify substantial completion if record drawings have not been updated.

1.4 RECORD SPECIFICATIONS

- A. General:
 - 1. During progress of the work, maintain one copy of specifications, including addenda, change orders and similar modifications issues in printed form during construction, and mark up variations (of substance) in actual work in comparison with text of

specifications and modifications as issued. Give particular attention to substitutions, selection of options, and similar information on work where it is concealed or cannot otherwise be readily discerned at a later date by direct observation. Note related record drawing information and product data, submit to Architect for Owner's records. Label front cover Project Record in 2 inch high letters.

1.5 RECORD PRODUCT DATA

- A. General: During progress of the work, maintain one copy of each product data submittal, and mark up significant variations in the actual work in comparison with submitted information. Include both variations in product as delivered to site, and variations from manufacturer's instructions and recommendations for installation. Give particular attention to concealed products and portions of the work which cannot otherwise be readily discerned at a later date by direct observation. Note related change orders and mark up record drawings and specifications accordingly. Upon completion of mark up, submit complete set to Architect for Owner's records. Label each data submittal Project Record in 2 inch high letters.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 017839

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies cast-in place concrete, including formwork, reinforcing, mix design, placement procedures, and finishes.
- B. Cast-in-place concrete work includes the following:
 - 1. Foundations and footings.
 - 2. Slabs-on-grade.
 - 3. Building frame members.
 - 4. Equipment pads and bases.
 - 5. Setting of anchor bolts, frames, and other items to be embedded in concrete.
 - 6. Dowels for masonry walls.
 - 7. Equipment pads.
 - 8. Laboratory field testing services.
 - 9. Concrete curbs, walks, and pavements.
- C. Related work specified elsewhere:
 - 1. Furnishing miscellaneous steel shapes, plates, and dovetail anchors embedded in concrete.
 - 2. Furnishing anchor bolts for structural steel.
 - 3. Furnishing piping, sleeves and conduit embedded in concrete.

1.3 SUBMITTALS

- A. General: Submit the following according to Conditions of the Contract and Division 1 Specification Sections.
- B. Product data for proprietary materials and items, including reinforcement and forming accessories, vapor retarders, admixtures, joint systems, curing compounds, and others if requested by Architect.
- C. Shop drawings reviewed and stamped by General Contractor for reinforcement detailing fabricating, bending, and placing concrete reinforcement. Comply with ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures" showing bar schedules, stirrup spacing, bent bar diagrams, and arrangement of concrete reinforcement. Include special reinforcing required for openings through concrete structures.

- D. Laboratory test reports for concrete materials and mix design test.
- E. Material certificates in lieu of material laboratory test reports when permitted by Architect. Material certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with or exceeds specified requirements. Provide certification from admixture manufacturers that chloride content complies with specification requirements.
- F. Concrete Mix Design Data: Submit, not less than 21 days prior to placing of concrete, the following proposed concrete mix design data:
 - 1. Intended usage and location for each type.
 - 2. Mix design for each type.
 - 3. Cement content in pounds per cubic yard.
 - 4. Coarse and fine aggregate in pounds per cubic yard.
 - 5. Water-cement ratio by weight.
 - 6. Cement type and manufacturer.
 - 7. Slump range.
 - 8. Air content range.
 - 9. Admixture types and manufacturers.
 - 10. Percent of admixtures by weight.
 - 11. Strength test data required to establish mix design.

1.4 QUALITY ASSURANCE

- A. Provide all materials and perform all work in accordance with ACI 301 “Specifications for Structural Concrete” and the reference specifications listed therein.
- B. Where the provisions of this specification conflict with those of any reference specification, the provisions of these specifications govern.
- C. The applicable provisions of the latest issue of the following ACI and CRSI Standards are made a part of these specifications. Where the provisions of any reference specification conflict with those of ACI 301, the more stringent provisions govern.

<u>ACI NUMBER</u>	<u>TITLE</u>
301	Specification for Structural Concrete.
302.1R	Recommended Practice for Concrete Floor and Slab Construction.
304.R	Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete
304.2R	Placing concrete by pumping methods.
305.R	Recommended Practice for Hot Weather Concreting
308	Recommended Practice Curing Concrete
309.R	Recommended Practice for Consolidation of Concrete
315	Manual of Standard Practice for Detailing Reinforced Concrete Structures
318-08	Building Code Requirements for Reinforced Concrete

347 503R 306R	Recommended Practice for Concrete Formwork Guide for Use of Epoxy Compounds - Committee 503 Report Concrete committee 503 report. Cold weather concreting.
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<u>CRSI NUMBER</u>	<u>TITLE</u>
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63	Recommended Practice for Placing Reinforcing Bars
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- D. Concrete Testing Service: Contractor shall retain a testing agency acceptable to Architect to perform material evaluation tests. Contractor will bear cost of tests, including cost of any retests due to failure of concrete to meet specified requirements.
- E. Materials and installed work may require testing and retesting at any time during progress of Work. Tests, including retesting of rejected materials for installed Work, shall be done at Contractor's expense.

PART 2 - PRODUCTS

2.1 CONCRETE MATERIALS

- A. Portland Cement - ASTM C 150, Type I. Type III may be used where authorized by the Engineer.
- B. Air-Entraining Admixtures - ASTM C 260, Darax AEA, W.R. Grace & Company, SIKA AER, SIKA, MB-AE10, Master Builders, AMEX, American Admixtures Corp. Air Mix, Euclid Chemical Corp.
- C. Water-Reducing Admixtures - ASTM C 494, Type A. WRDA with Hycol, W.R. Grace & Company Plastocrete, SIKA, Pozzoloth 300N, Master Builders, Lubricon 300, American Admixtures.
- D. No accelerators, retarders or admixtures containing chlorides will be permitted.
- E. Use fresh, clean and drinkable water for concrete.
- F. For normal weight concrete use coarse and fine aggregate to conform to ASTM C33.
- G. Super Plasticizer ASTM C494 Type F or G where authorized by the Engineer.
- H. Fly-ash ASTM C618 Type "F" maximum 20% by weight. Do not use for architectural concrete. Do not use for slabs-on-grade.

2.2 PROPORTIONING

- A. Concrete Strength – See structural drawings for minimum concrete compressive strength at 28 days.
- B. Properties:

1. Provide concrete having the general properties specified for each class of concrete shown on drawings to provide workability and consistency so concrete can be worked readily into forms and around reinforcement without segregation or bleeding, and to provide an average compressive strength adequate to meet acceptance requirements of ACI 301.

2.3 PRODUCTION OF CONCRETE

- A. Concrete must be batched, mixed and transported in accordance with specifications for ready-mixed concrete ASTM C 94.
- B. Slump Limits: proportion and design mixes to result in concrete slump at point of placement as follows:
 1. Ramps and sloping surfaces: Not more than 3 inches.
 2. Reinforced foundation systems: Not less than 3 inches and not more than 5 inches.
 3. Concrete containing high-range water-reducing admixture (superplasticizer): Not more than 8 inches after adding admixture to site-verified 2-3 inch slump concrete.
 4. Slabs and beams: Not less than 3 inches and not more than 5 inches.
 5. Other concrete: No more than 4 inches.
- C. Provide at the site, delivery tickets for each batch of concrete showing the following:
 1. Batch number, volume and date
 2. Time of loading
 3. Design 28-day compressive strength
 4. Concrete type
 5. Cement content in pounds per cubic yard
 6. Water content in pounds per cubic yard
 7. Admixtures in amount per cubic yard
 8. Maximum amount of water that may be added at the job site
- D. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, as accepted by Architect. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Architect before using in work.
- E. Restrict the addition of mix water at the job site. Do not add water without the approval of the general contractor and do not exceed slump limitations or total allowable water-to-cement ratio. Use cold water from the truck tank and remix to achieve consistency. The reports shall indicate how much water was added at the job site. Note on delivery ticket amount of water added and name of person authorizing.
- F. During hot weather, conform to the detailed recommendations of ACI 305.

2.4 FORM MATERIALS

- A. Forms for Exposed Finish Concrete: Plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings.
 - 1. Use overlaid plywood complying with U.S. Product Standard PS-1 "A-C or B-B High Density Overlaid Concrete Form," Class I.
- B. Forms for Unexposed Finish Concrete: Plywood, lumber, metal, or another acceptable material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Form Release Agent: Provide commercial formulation form release agent with a maximum of 350 g/L volatile organic compounds (VOCs) that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
- D. Form Ties: Factory-fabricated, adjustable-length, removable or snap-off metal form ties designed to prevent form deflection and to prevent spalling of concrete upon removal. Provide units that will leave no metal closer than 1-1/2 inches to the plane of the exposed concrete surface.

2.5 REINFORCEMENT

A. GENERAL

- 1. Details of concrete reinforcement and accessories not covered herein or shown on drawings to be in accordance with ACI 315.
- 2. Reinforcement is to be secured in proper position and thoroughly clean of loose rust, scale, grease or other coatings.

B. REINFORCING MATERIALS

- 1. Unless otherwise indicated, for all reinforcing shown provide deformed bars conforming to ASTM A 615, or a 616 Grade 60.
- 2. Smooth dowels - ASTM A 615 and A 616, plain bars having a minimum yield strength of 60,000 psi.
- 3. Welded wire fabric - ASTM A 185 plain wire fabric in flat sheets.
- 4. Plain wire to conform to ASTM A 82.
- 5. Accessories to conform to ACI 315.
- 6. Where reinforcing rods are used as supports, use rods no lighter than No. 5.
- 7. Where concrete surfaces are exposed, make those portions of all accessories in contact with the concrete surface or within 1/2 inch thereof, of plastic or stainless steel.

C. FIBROUS REINFORCING

1. Reinforcing fibers to be virgin 100% polypropylene or nylon collated fibers, per ASTM C1116, specifically manufactured for use in concrete, containing no reprocessed olefin materials, with the following minimum physical characteristics:
 - a. Specific gravity: 0.92
 - b. Modulus of elasticity: 500-700 KSI
 - c. Tensile strength: 70-110 KSI
 - d. Fiber length: multi-design gradation, 3/4" min.
2. Reinforcing fibers to be supplied by the following approved manufacturers:
 - a. "FIBERSTRAND 100", Euclid Chemical Company
 - b. "FIBERMESH", Fibermesh, Inc.
 - c. "FORTA SUPER-NET", Forta Corporation
 - d. "NYCON FIBERS", Nycon, Inc.
 - e. "MASTERFIBER M100," BASF
3. Fibers to be added in manufacturer's approved amount with a minimum of 1.5 pounds per cubic yard for poly and 1.0 pounds per cubic yard for nylon.
4. Concrete to be batched and mixed in accordance with fiber manufacturer's recommendations for uniform and complete dispersion of fiber bundles into single strands within concrete.
5. Reinforcing fibers may be used in concrete slabs-on-grade in lieu of WWF with approval of the engineer. Fibers will not be permitted in Apparatus Area or Maintenance Bays slabs.
6. Submit product data for review and approval.

2.6 RELATED MATERIALS

- A. Dovetail Anchor Slots: Hot-dip galvanized sheet steel, not less than 0.0336 inch thick with bent tab anchors. Fill slot with temporary filler or cover face opening to prevent intrusion of concrete or debris.
- B. Plastic Vapor Retarder: ASTM E 1745, Class A, not less than 15 mils thick per ACI 302.2R-06. Include manufacturer's recommended pressure-sensitive joint tape.
 1. Products:
 - a. Fortifiber Corporation; "Moistop Ultra 15"
 - b. Reef Industries, Inc.; "Griffolyn 15-Mil"
 - c. Stego Industries, LLC; "Stego Wrap, 15-Mil."
 - d. Viper; "Vapor Check 15-Mil."
 - e. W.R. Meadows; "Perminator 15-Mil."
 2. Pipe Boots
 - a. Construct pipe boots from vapor retarder material and pressure sensitive tape per vapor retarder manufacturer's instructions.
- C. Moisture-Retaining Cover: One of the following, complying with ASTM C 171.

1. Waterproof paper.
 2. Polyethylene film.
 3. Polyethylene-coated burlap.
- D. Liquid Curing, and Sealing and Hardening Compounds for application on floor slab in Apparatus Area 101, exterior concrete aprons and walks, and other slabs as scheduled on drawings.
1. Curing Compound: (required, unless properly used moisture-retaining sheet materials or water spray curing is provided for at least 72 hours) One of the following:
 - a. "Day-Chem Sil Cure J-13", Dayton Superior Chemical Division
 - b. "Kure-N-Harden", Sonneborn
 2. Sealing and Hardening Compound:
 - a. "Day-Chem Sure-Hard J-17", Dayton Superior Chemical Division
 - b. "Kure-N-Harden", Sonneborn
- E. Expansion Joint Filler: 1/2" thick closed cell polyethylene foam filler conforming to ASTM D 3575, with pre-scored removable top strip.
1. "Deck-O-Foam Expansion Joint Filler, " Deck-O-Seal.
- F. Metal Keyed Control Joints: Galvanized steel keyed joint with removable plastic cap to create straight void at top of joint for sealing.
1. "QuicKey", BoMetals, Inc, Catalog # 2000 with removable, 1/2 " deep by 13/32 " wide plastic cap.
- G. Epoxy Adhesive (Bonding Agent): ASTM C 881, two-component material suitable for use on dry or damp surfaces. Provide material type, grade, and class to suit Project requirements.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Spec-Bond 100, Conspec Marketing and Mfg. Co.
 - b. Euco Epoxy System #452, Euclid Chemical Co.
 - c. Concessive Liquid LPL, Master Builders, Inc.

2.7 CONCRETE MIXING

- A. Ready-Mixed Concrete: Comply with requirements of ASTM C 94, and as specified.
1. When air temperature is between 85 deg F and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 GENERAL

- A. Coordinate the installation of joint materials, vapor retarder, and other related materials with placement of forms and reinforcing steel.

3.2 FORMS

- A. General: Design, erect, support, brace, and maintain formwork to support vertical, lateral, static, and dynamic loads that might be applied until concrete structure can support such loads. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position. Maintain formwork construction tolerances and surface irregularities complying with the following ACI 301 and 347 limits:
 - 1. Form Design shall be performed by a Professional Engineer registered in the State of Florida.
 - 2. Earth cuts may be used as footing forms for vertical surfaces. Increase size by 2 inches.
- B. Construct forms to sizes, shapes, lines, and dimensions shown and to obtain accurate alignment, location, grades, level, and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in the Work. Use selected materials to obtain required finishes. Solidly butt joints and provide backup at joints to prevent cement paste from leaking.
- C. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like for easy removal.
- D. Provide temporary openings for clean-outs and inspections where interior area of formwork is inaccessible before and during concrete placement. Securely brace temporary openings and set tightly to forms to prevent losing concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- E. Chamfer exposed corners and edges as indicated, using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.
 - 1. Chamfer all exposed tie beam-to-masonry wall joints using quarter-round molding in bottoms of forms.
- F. Removal strength: The concrete will be presumed to have reached its removal strength when additional test cylinders (paid for by the Contractor) are field cured along with the concrete they represent and have reached the specified strength.

- G. Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses, and chases from trades providing such items. Accurately place and securely support items built into forms.
- H. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before placing concrete. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
 - 1. Forms and shoring are the responsibility of the General Contractor.

3.3 VAPOR RETARDER INSTALLATION

- A. General: Place vapor retarder sheeting in position with longest dimension parallel with direction of pour.
- B. Lap vapor retarder over footings and seal to foundation walls.
- C. Lap joints 6 inches and seal with manufacturer's recommended pressure-sensitive tape. Repair all punctures. Seal tightly around penetrations such as pipe and conduit using manufacturer's pipe boot.
- D. Repair damaged areas by cutting patches of vapor retarder, overlapping damaged area 6 inches and taping all four sides with tape.

3.4 PLACING REINFORCEMENT

- A. General: Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars," for details and methods of reinforcement placement and supports and as specified.
 - 1. Avoid cutting or puncturing vapor retarder/barrier during reinforcement placement and concreting operations. Repair damages before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials that reduce or destroy bond with concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as approved by Architect.
- D. Place reinforcement to maintain minimum coverages as indicated for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.
 - 1. Minimum concrete coverage for reinforcing unless otherwise indicated on the Drawings, shall be:

- a. Sides and bottoms of footings and grade beams: 3".
 - b. Top of footings and grade beams: 2".
 - c. Columns and Beams: 1-1/2"
 - d. Slabs: 3/4" from top, interior; 1-1/2" from top, exterior.
- E. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one spacing of cross wires plus 2 inches. Offset laps of adjoining widths to prevent continuous laps in either direction.
- F. Chair welded wire fabric at 3'-0" o.c., max. in each direction.

3.5 JOINTS

- A. Construction Joints: Locate and install construction joints so they do not impair strength or appearance of the structure, as acceptable to architect.
- B. Provide keyways at least 1-1/2 inches deep in construction joints in walls and slabs and between walls and footings. Bulkheads designed and accepted for this purpose may be used for slabs.
- C. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints except as indicated otherwise. Do not continue reinforcement through sides of strip placements of floors and slabs.
- D. Use bonding agent on existing concrete surfaces that will be joined with fresh concrete.
- E. Isolation Joints in Slabs-on-Grade: Construct isolation joints in slabs-on-grade at points of contact between slabs-on-grade and vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
1. Provide 1/2" expansion joint filler as specified herein.
 2. Provide sealant over all isolation and expansion joints.
 3. Joint sealants are specified in Division 7 Section "Joint Sealants."
- F. Contraction (Control) Joints in Slabs-on-Grade: Construct joints to form panels of patterns as shown. If joint pattern is not shown, provide joints not exceeding 15 feet in either direction and locate to conform to bay spacing wherever possible (at column centerlines, half bays, third bays).
1. Saw joints in slabs before the formation of uncontrolled cracking (i.e., cracking that occurs at locations other than construction, control, expansion or contraction joints) and as soon as the concrete has hardened sufficiently to permit curing without chipping, spalling, or tearing. Saw joints both during the day and night as required. In no event shall saw cuts be made more than 6 hours after placement of concrete.
 - a. Saw joints for a depth equal to at least one-fourth of slab thickness.

- b. Fill sawed joints within the building with self-leveling elastomeric sealant after concrete has cured and dried.
2. If concrete cracks at locations other than construction, control, expansion or contraction joints, the Contractor may be required to remove and replace the defective work (cracked concrete) at no additional cost to the Owner.

3.6 INSTALLING EMBEDDED ITEMS

- A. General: Set and build into formwork anchorage devices and other embedded items required for other work that is attached to or supported by cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached.
- B. Install dovetail anchor slots in concrete structures as indicated on drawings.
- C. Forms for Slabs: Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and contours in finished surfaces. Provide and secure units to support screed strips using strike-off templates or compacting-type screeds.

3.7 PREPARING FORM SURFACES

- A. General: Coat contact surfaces of forms with an approved, nonresidual, low-VOC, form-coating compound before placing reinforcement.
- B. Do not allow excess form-coating material to accumulate in forms or come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply according to manufacturer's instructions.
 1. Coat steel forms with a nonstaining, rust-preventative material. Rust-stained steel formwork is not acceptable.

3.8 CONCRETE PLACEMENT

- A. Notification: Notify Architect at least 48 hours prior to pouring any concrete.
- B. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.
- C. General: Comply with ACI 304, "Guide for Measuring, Mixing, Transporting, and Placing Concrete," and as specified.
 1. Unless otherwise shown or indicated, provide minimum concrete protective covering for reinforcement as follows:
 - a. Concrete deposited against the ground, 3".

- b. Formed surfaces exposed to weather or in contact with the ground, 2" for reinforcing bars No. 6 or larger, and 1/2" for reinforcing bars No. 5 or smaller.
 - c. Interior surfaces, 1-1/2" for beams, girders and columns, 3/4" for slabs, walls and joists.
 - d. See drawings for special conditions.
- D. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened sufficiently to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation at its final location.
- E. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers no deeper than 24 inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
- 1. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete complying with ACI 309R.
 - 2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the machine. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix to segregate.
- F. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until completing placement of a panel or section.
- 1. Consolidate concrete during placement operations so that concrete is thoroughly worked around reinforcement, other embedded items and into corners.
 - 2. Bring slab surfaces to correct level with a straightedge and strike off. Use bull floats or darbies to smooth surface free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.
 - 3. Maintain reinforcing in proper position on chairs during concrete placement.
- G. Cold-Weather Placement: Comply with provisions of ACI 306 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
- H. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
- 1. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.

- I. Hot-Weather Placement: When hot weather conditions exist that would impair quality and strength of concrete, place concrete complying with ACI 305 and as specified.
 - 1. Cool ingredients before mixing to maintain concrete temperature at time of placement to below 90 deg F. Mixing water may be chilled or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 - 2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedding in concrete.
 - 3. Fog spray forms, reinforcing steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without puddles or dry areas.
 - 4. Use water-reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, as acceptable to Architect.

3.9 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: Provide a rough-formed finish on formed concrete surfaces not exposed to view in the finished Work or concealed by other construction. This is the concrete surface having texture imparted by form-facing material used, with tie holes and defective areas repaired and patched, and fins and other projections exceeding 1/4 inch in height rubbed down or chipped off.
- B. Smooth-Formed Finish: Provide a smooth-formed finish on formed concrete surfaces exposed to view or to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, painting, or another similar system. This is an as-cast concrete surface obtained with selected form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch defective areas with fins and other projections completely removed and smoothed.
- C. Pan formwork to provide Class D finish.
- 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.

3.10 MONOLITHIC SLAB FINISHES

- A. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as specified; slab surfaces to be covered with membrane or elastic waterproofing, membrane or elastic roofing, or sand-bed terrazzo; and where indicated.
 - 1. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating, using float blades or float shoes only, when

surface water has disappeared, or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats or by hand-floating if area is small or inaccessible to power units. Finish surfaces to tolerances of F(F) 18 (floor flatness) and F(L) 15 (floor levelness) measured according to ASTM E 1155. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.

- B. Trowel Finish: Apply a trowel finish to monolithic slab surfaces exposed to view and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint, or another thin film-finish coating system.
 - 1. After floating, begin first trowel-finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and finish surfaces to tolerances of F(F) 20 (floor flatness) and F(L) 17 (floor levelness) measured according to ASTM E 1155. Grind smooth any surface defects that would telegraph through applied floor covering system.
- C. Trowel and Fine Broom Finish: Where a polyurethane floor coating is to be applied, or where ceramic or quarry tile is to be installed with thin-set mortar, apply a trowel finish as specified, then immediately follow by slightly scarifying the surface with a fine broom.
- D. Trowel and Medium Broom Finish: Required at Apparatus Area 131, concrete aprons, and where "non-slip" broom finish is indicated for concrete walks, ramps, or steps, apply a trowel finish as specified, then immediately follow by slightly scarifying the surface with a medium broom.

3.11 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place, and cure concrete as specified to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on drawings. Set anchor bolts for machines and equipment to template at correct elevations, complying with diagrams or templates of manufacturer furnishing machines and equipment.

3.12 CONCRETE CURING AND PROTECTION

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. In hot, dry, and windy weather protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material. Apply according to manufacturer's instructions after screeding and bull floating, but before power floating and troweling.
- B. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing.
- C. Curing Methods: Cure concrete by curing compound, by moisture-retaining cover curing, sprinkling, or by combining these methods, as specified.
- D. Provide moisture-retaining cover curing as follows:
 - 1. Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 12 inches and sealed by waterproof tape or adhesive. Cure for not less than 7 days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
- E. Apply curing compound and sealing and hardening compound on exposed interior slabs and on exterior slabs, aprons, drives, and walks as follows:
 - 1. Apply curing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours and after surface water sheen has disappeared). Apply uniformly in continuous operation by power spray or roller according to manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - 2. Do not use membrane-forming curing compounds for curing surfaces to receive the following coverings, unless it has been demonstrated that such compounds will not prevent bond of:
 - a. Carpet
 - b. Flexible flooring
 - c. Ceramic tile
 - d. Other specified floor systems
 - 3. Apply sealing and hardening compound in accordance with manufacturer's written instructions and as follows:
 - a. Do not apply compound until horizontal joint sealants in slabs have been installed and fully cured.
 - b. Thoroughly clean slab of all dirt and contaminants and allow to dry thoroughly prior to application of compound.
 - c. Recoat areas subjected to heavy rainfall within three hours after initial application.

- F. Curing Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces, by moist curing with forms in place for the full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.

3.13 SHORES AND SUPPORTS

- A. General: Comply with ACI 347 for shoring and reshoring in multistory construction, and as specified.
- B. Extend shoring from ground to roof for structures four stories or less, unless otherwise permitted.

3.14 REMOVING FORMS

- A. General: Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form-removal operations, and provided curing and protection operations are maintained.
- B. Formwork supporting weight of concrete, such as beam soffits, joists, slabs, and other structural elements, may not be removed in less than 14 days or until concrete has attained at least 75 percent of design minimum compressive strength at 28 days. Determine potential compressive strength of in-place concrete by testing field-cured specimens representative of concrete location or members.
- C. Form-facing material may be removed 4 days after placement only if shores and other vertical supports have been arranged to permit removal of form-facing material without loosening or disturbing shores and supports.
- D. Formwork and facing forms for members such as grade beams, foundation walls and spread footings not supporting the weight of concrete may be removed as soon as the concrete has hardened sufficiently to resist damage from the removal operations.

3.15 REUSING FORMS

- A. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-coating compound as specified for new formwork.
- B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use patched forms for exposed concrete surfaces except as acceptable to Architect.

3.16 CONCRETE SURFACE REPAIRS

- A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removing forms, when acceptable to Architect.
- B. Mix dry-pack mortar, consisting of one part Portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing.
1. Cut out honeycombs, rock pockets, voids over 1/4 inch in any dimension, and holes left by tie rods and bolts down to solid concrete but in no case to a depth less than 1 inch. Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush-coat the area to be patched with bonding agent. Place patching mortar before bonding agent has dried.
 2. For surfaces exposed to view, blend white Portland cement and standard Portland cement so that, when dry, patching mortar will match surrounding color. Provide test areas at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.
- C. Repairing Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Architect. Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes and fill with dry-pack mortar or precast cement cone plugs secured in place with bonding agent.
1. Repair concealed formed surfaces, where possible, containing defects that affect the concrete's durability. If defects cannot be repaired, remove and replace the concrete.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface tolerances specified for each surface and finish. Correct low and high areas as specified. Test unformed surfaces sloped to drain for trueness of slope and smoothness by using a template having the required slope.
1. Repair finished unformed surfaces containing defects that affect the concrete's durability. Surface defects include crazing and cracks in excess of 0.01 inch wide or that penetrate to the reinforcement or completely through nonreinforced sections regardless of width, spalling, popouts, honeycombs, rock pockets, and other objectionable conditions.
 2. Correct high areas in unformed surfaces by grinding after concrete has cured at least 14 days.
 3. Correct low areas in unformed surfaces during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete. Proprietary underlayment compounds may be used when acceptable to Architect.

defective areas, except random cracks and single holes not exceeding 1 inch in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose reinforcing steel with at least 3/4 inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

3.17 QUALITY CONTROL TESTING DURING CONSTRUCTION

- A. Testing Agency: Engage a qualified independent testing and inspecting agency to sample materials, perform tests, and submit test reports during concrete placement according to requirements specified in this Article.
- B. Sampling and testing for quality control during concrete placement shall include the following:
 - 1. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
 - a. Slump: ASTM C 143; one test at point of discharge for each day's pour of each type of concrete; additional tests when concrete consistency seems to have changed.
 - b. Air Content: ASTM C 231, pressure method for normal weight concrete; one for each day's pour of each type of air-entrained concrete.
 - c. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below, when 80 deg F and above, and one test for each set of compressive-strength specimens.
 - d. Compression Test Specimen: ASTM C 31; one set of four standard cylinders for each compressive-strength test, unless otherwise directed. Mold and store cylinders for laboratory-cured test specimens except when field-cured test specimens are required.
 - e. Compressive-Strength Tests: ASTM C 39; one set for each day's pour exceeding 5 cu. yd. plus additional sets for each 50 cu. yd. more than the first 25 cu. yd. of each concrete class placed in any one day; one specimen tested at 7 days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required.
 - 2. When frequency of testing will provide fewer than five strength tests for a given class of concrete, conduct testing from at least five randomly selected batches or from each batch if fewer than five are used.
 - 3. When total quantity of a given class of concrete is less than 50 cu. yd., Architect may waive strength testing if adequate evidence of satisfactory strength is provided.
 - 4. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.
 - 5. Strength level of concrete will be considered satisfactory if every average of any three consecutive compressive strength tests equals or exceeds specified compressive strength and no individual strength test result falls below specified compressive strength by more than 500 psi.

- B. Test results shall be reported in writing to Architect, Structural Engineer, ready-mix producer, and Contractor within 24 hours after tests. Reports of compressive strength tests shall contain the Project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-day tests and 28-day tests.
- C. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.
- D. Additional Tests: The testing agency will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by Architect. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.

3.18 ACCEPTANCE OF STRUCTURE

A. GENERAL

1. Acceptance of structure will be made in conformance with ACI 301, except that contractor must pay all costs incurred for providing any additional testing or analysis required when strength of structure is considered potentially deficient.

B. CRACKS

1. The contractor will be required to restore without cost to the owner any concrete except for slabs-on-grade which develops cracks within a period of one year after placement which has not been caused by action of the owner or others in overstressing the concrete.
2. Repair the cracks by means that will restore the cracked members to their designed strength and appearance by acceptable methods which will not impair the appearance of the affected surfaces, if exposed. Such repairs must be performed using suitable epoxy cements employed by an organization having satisfactorily demonstrated ability in the techniques necessary to effect such repairs, or by other acceptable methods.

END OF SECTION 033000

SECTION 042000 - UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes unit masonry assemblies consisting of the following:
 - 1. Concrete masonry units.
 - 2. Brick.
 - 3. Keystones.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Wood nailers and blocking built into unit masonry are specified in Division 6 Section "Rough Carpentry."
 - 2. Hollow metal frames in unit masonry openings are specified in Division 8 Section "Hollow Metal Doors and Frames."

1.3 SUBMITTALS

- A. Product data for each different masonry unit, accessory, and other manufactured product specified.
- B. Shop drawings for reinforcing detailing fabrication, bending, and placement of unit masonry reinforcing bars. Comply with ACI 315 "Details and Detailing of Concrete Reinforcement" showing bar schedules, stirrup spacing, diagrams of bent bars, and arrangement of masonry reinforcement.
- C. Samples for verification of the following:
 - 1. Full-size units for each different exposed masonry unit required showing the full range of exposed colors, textures, and dimensions to be expected in the completed construction.
 - 2. Colored-masonry mortar samples for each color required showing the full range of colors expected in the finished construction. Make samples using the same sand and mortar ingredients to be used on the Project. Label samples to indicate type and amount of colorant used.
 - 3. Accessories embedded in the masonry.

1.4 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of the following, except where more stringent requirements are shown or specified.
 - 1. A.C.I. 530-05: Building Code Requirements for Masonry Structures.
 - 2. A.C.I. 530.1-05: Specifications for Masonry Structures.
- B. Fire-Resistance Ratings: Where indicated, provide materials and construction identical to those of assemblies with fire resistance ratings determined per ASTM E 119 by a testing and inspecting agency, by equivalent concrete masonry thickness, or by another means, as acceptable to authorities having jurisdiction.
- C. Single-Source Responsibility for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from one source and by a single manufacturer for each different product required.
- D. Single-Source Responsibility for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source or producer for each aggregate.
- E. Pre-Installation Meeting:
 - 1. Convene meeting at project site within one week of scheduled start of installation with representatives of the following in attendance: Owner, Architect, General Contractor, Masonry Sub-Contractor and Manufacturer's Representative or Distributor.
 - 2. Review substrate conditions, requirements of related work, installation instructions, storage and handling procedures, and protection measures.
 - a. Confirm required locations of all concrete masonry unit and brick expansion and control joints.
 - 3. Keep minutes of meeting including responsibilities of various parties and deviations from specifications and installation instructions.
 - 4. Distribute minutes to attendees within 72 hours.
- F. Mockup: Prior to installing unit masonry, construct sample wall panels to verify selections made under sample submittals and to demonstrate aesthetic effects as well as other qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for final unit of Work.
 - 1. Locate mockup on site in the location as directed by Architect.
 - 2. Mockup shall be approximately 4'-0" high by 6'-8" long.
 - 3. Build mockup of typical wall area comprised of 8" thick concrete block backup wythe, grout-filled collar joint, horizontal joint reinforcing, and 4" brick veneer including colored mortars.
 - 4. Clean exposed faces of mockups with masonry cleaner indicated.
 - 5. Notify Architect one week in advance of the dates and times when mockups will be constructed.
 - 6. Protect accepted mockups from the elements with weather-resistant membrane.

7. Retain and maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - a. Acceptance of mockups is for color, texture, and blending of masonry units; relationship of mortar colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by Architect in writing.
 - b. Acceptance of mockups does not constitute approval of deviations from the Contract Documents contained in mockups, unless such deviations are specifically approved by Architect in writing.
 - c. When directed, demolish and remove mockups from Project site.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms, under cover, and in a dry location to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion, and other causes. If units become wet, do not install until they are in an air-dried condition.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.6 PROJECT CONDITIONS

- A. Protection of Masonry: During erection, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
 1. Extend cover a minimum of 48 inches down both sides and hold cover securely in place.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least 3 days after building masonry walls or columns.
- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
 1. Protect base of walls from rain-splashed mud and mortar splatter by coverings spread on ground and over wall surface.
 2. Protect sills, ledges, and projections from mortar droppings.
 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.

4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt on completed masonry.
- D. Hot-Weather Requirements: Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required. Do not apply mortar to substrates with temperatures of 100 deg F and above.

PART 2 - PRODUCTS

2.1 CONCRETE MASONRY UNITS

- A. General: Provide shapes indicated and as follows for each form of concrete masonry unit required.
1. Provide special shapes for lintels, control joints (sash blocks), bonding, and other special conditions.
 2. Provide square-edged units for outside corners.
- B. Concrete Masonry Units: ASTM C 90 and as follows:
1. Weight Classification: Normal weight.
 2. Size: Manufactured to the actual dimensions listed below (within tolerances specified in the applicable referenced ASTM specification) for the corresponding nominal sizes indicated on Drawings:
 - a. 8 inch nominal: 7-5/8 inch actual.
 - b. 12 inch nominal: 11-5/8 inch actual.
 3. Exposed Faces: Manufacturer's standard color and texture, unless otherwise indicated.
 4. Compressive strength = 2000 psi, minimum, based on net area; f'm = 1500 psi minimum.

2.2 BRICK

- A. Face Brick Standard: ASTM C 216 and as follows:
1. Grade SW.
 2. Type FBS.
 3. Size: Based upon standard modular dimensions of 2-1/4" x 3-5/8" x 7-5/8":
 - a. Manufacturer: Hanson Brick Company, Inc., Pine Hall Brick, Triangle Brick, or Cherokee Brick and Tile Co.
 4. Color and Texture:
 - a. Running bond units to be one of the following:

- 1) "Red Semi Smooth Flash," Hanson Brick
 - 2) "Manchester", " Pine Hall Brick
 - 3) "Flashed Wirecut," Triangle Brick
 - 4) "Natchez", Cherokee Brick and Tile Co.
 - 5) "Georgian Maroon," Cherokee Brick and Tile Co.
- b. Final color to be selected by Architect based upon sample panel submittals and review of field-constructed mock-up of typical exterior face brick cavity wall.
5. For sills and similar applications where brick surfaces are exposed to view which otherwise would be concealed, provide uncured solid units with all exposed surfaces finished.
 6. For bricks at flat ("jack") arches above windows, provide special parallelogram shapes with 70 degree skew-back angle and 7 5/8" overall height as indicated on drawings.
 7. For soldier course outside corners, provide special shapes as indicated on drawings. The two adjacent, exposed surfaces shall be finished.

2.3 KEYSTONES

- A. Provide keystones as indicated on drawings for flat ("jack") arches and curved ("segmental") arches.
- B. Stone: Indiana limestone; 3 5/8" thick by 7 5/8" tall (flat arch); 11 5/8" (curved arch).
 1. Color: Buff.
 2. Texture: Smooth, "sand rubbed".
- C. Skew-Back Angle:
 1. Flat ("jack") arches: 70 degrees.
 2. Curved ("segmental") arches: As required by arch radius.

2.4 MORTAR AND GROUT MATERIALS

- A. Masonry Cement: ASTM C 91.
 1. Provide colored pigmented mortars for brick work. Use premixed colored masonry cements of formulation required to produce colors indicated, or if not indicated, as selected from manufacturer's standard formulations.
- B. Aggregate for Mortar: ASTM C 144; except for joints less than 1/4 inch, use aggregate graded with 100 percent passing the No. 16 sieve.
- C. Aggregate for Grout: ASTM C 404.
- D. Water: Potable.

2.5 REINFORCING STEEL

- A. Steel Reinforcing Bars: Material and grade as follows:
 - 1. Billet steel complying with ASTM A 615.
 - a. Grade 60.
- B. Deformed Reinforcing Wire: ASTM A 496, with ASTM A 153, Class B-2 zinc coating.

2.6 JOINT REINFORCEMENT, TIES AND ANCHORING DEVICES

- A. Materials: Comply with ASTM A 951 and requirements indicated below for basic materials and with requirements indicated under each item of joint reinforcement, tie and anchor, for size and other characteristics:
 - 1. Hot-dip galvanized steel wire: ASTM A 82 for uncoated wire and with ASTM A 153, Class B-2 (1.5 oz. Per sq. ft. of wire surface) for zinc coating applied after prefabrication into units.
- B. Provide welded wire units prefabricated in straight lengths of not less than 10', with matching corner and tee units. Fabricate from cold-drawn steel wire complying the ASTM A 82, with deformed continuous side rods and plain cross rods, into units with widths of approximately 2" less than nominal width of walls and partitions as required to position side rods for full embedment in mortar with mortar coverage of not less than 5/8" on joint faces exposed to exterior, and not less than 1/2" elsewhere.

Provide the following type of joint reinforcing unless otherwise indicated.

- 1. For single wythe walls, provide ladder type with cross rods spaced not more than 16" o.c.
 - 2. For brick veneer-on-block walls, provide ladder type with cross rods spaced not more than 16" o.c. with adjustable wall tie eye sections welded on at 16" o.c. Provide rectangular adjustable wire wall tie pintle sections fitted into eye sections to extend within 1" of exterior face of brick veneer. Provide Dur-O-Wal "Ladur-Eye" multi-wythe wall system.
 - 3. Wire size for side and cross rods: No. 9.
- C. Dovetail Slots and Anchors: Maintain continuity of brick veneer anchoring system at all formed and poured reinforced concrete columns by providing dovetail slots and anchors.
 - 1. Dovetail slots to be 22 gauge, hot-dipped galvanized steel, spaced 16" o.c. maximum. Slots shall extend the full height of the brick veneer. Provide Dur-O-Wal D/A 100 slots or equal.
 - 2. Dovetail anchors to be triangular units, 3/16" diameter by 4-1/2" in length from dovetail or in length as required to position outside of anchor at approximate center of block veneer. Anchors shall be hot-dip galvanized. Provide Dur-O-Wal D/A 724 anchors or equal.

- D. Manufacturers: Subject to compliance with requirements, provide products of one of the following:
1. AA Wire products Co.
 2. Dur-O-Wal, Inc.
 3. Heckman Building Products, Inc.
 4. Hohmann & Barnard, Inc.
 5. Masonry Reinforcing Corp. of America
 6. National Wire Products Corp.

2.7 MISCELLANEOUS TIES AND ANCHORS

- A. Corrugated Wall Ties: Hot dipped galvanized steel, 7/8" wide by 7" long; 22 gage.
- B. Anchor Bolts: Steel bolts complying with ASTM A 307; with ASTM A 563 hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153, Class C; of diameter and length indicated and in the following configurations:
1. Headed bolts.
 2. Nonheaded bolts, straight.
 3. Nonheaded bolts, bent in manner indicated.

2.8 EMBEDDED FLASHING MATERIALS

- A. Flexible, self-sealing wall flashing.
1. Description: Self-sealing, self-healing, fully adhering, composite flexible flashing consisting of 32 mil thick pliable and highly adhesive rubberized asphalt compound bonded completely and integrally to 8 mil thick, high-density, four plies of cross-laminated polyethylene film to produce an overall 40 mil thickness in rolls 75 feet long; protected from contamination from dust or dirt by a silicone-coated release sheet, to be removed immediately before installation.
 2. Width: 12, 18, or 36 inches as required by flashing conditions and details.
 3. Manufacturer: W.R. Grace – "Perm-A-Barrier Wall Flashing."
- B. Termination Mastic
1. Description: Rubberized asphalt-based mastic for use in sealing flashing membrane terminations and punctures.
 2. Manufacturer: W.R. Grace – "Bituthene Mastic".

2.9 MISCELLANEOUS MASONRY ACCESSORIES

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

- B. Weepholes: Wicking material to be cotton rope, $\frac{1}{4}$ to $\frac{3}{8}$ inch in diameter, in length required for flush installation on exterior side of wall and 18" in cavity between wythes.
- C. Cavity Drainage Material: 1 inch thick, free-draining mesh; made from polyethylene strands and shaped to avoid being clogged by mortar dropping. Provide one of the following:
 - 1. Mortar Break; Advanced Building Products, Inc.
 - 2. CavClear Masonry Mat; CavClear.
 - 3. Mortar Net; Mortar Net USA, Ltd.
 - 4. Mortar Stop; Polytite Manufacturing Corp.

2.10 MASONRY WALL INSULATION, SINGLE WYTHE WALLS

- A. For single wythe masonry walls requiring thermal insulation, provide nontoxic foamed-in-place masonry wall insulation, R value of not less than 6.0 in 8" concrete masonry, with a density of 125 lbs. or greater. Insulation shall be non-combustible, shall have a Class A flame spread rating, shall be formaldehyde-free, and shall meet all applicable state and federal insulation standards.
 - 1. Insulation shall be installed only by applicators who have been trained and certified by the insulation manufacturer.
 - 2. Subject to compliance with specifications; provide insulation by one of the following:
 - a. Tailored Chemical Products, Inc.: "Core-Fill 500".
 - b. Thermco: "Thermco Foam".
 - c. C.P. Chemical Co., Inc.: "Tripolymer Foam Insulation".

2.11 CAVITY WALL INSULATION

- A. Extruded-Polystyrene Board Insulation: Rigid, cellular, 1" thick polystyrene thermal insulation with closed cells and integral high-density skin; formed by the expansion of polystyrene base resin in an extrusion process to comply with ASTM C 578, Type IV; minimum aged R-Value of 5.0. Provide one of the following:
 - 1. Dow "Cavitymate Plus".
 - 2. Owens Corning "Foamular CW 25".
 - 3. Tenneco "Amofoam".
- B. Adhesive: Type recommended by insulation board manufacturer for application indicated.
- C. Tape for Joints: Type recommended by insulation board manufacturer for application indicated.

2.12 MASONRY CLEANERS

- A. Job-Mixed Detergent Solution: Solution of 1/2-cup dry measure tetrasodium polyphosphate and 1/2-cup dry measure laundry detergent dissolved in 1 gal. of water.

2.13 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.
- B. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification, for job-mixed mortar; and ASTM C 1142 for ready-mixed mortar, of types indicated below:
 - 1. Use Type S mortar for concrete masonry applications.
 - 2. Use Type N mortar for brick masonry applications.
 - 3. Include admixture and follow admixture label instructions.
- C. Grout for Unit Masonry: Comply with ASTM C 476. Use grout of consistency indicated or, if not otherwise indicated, of consistency at time of placement that will completely fill spaces intended to receive grout.
 - 1. Minimum Compressive Strength: 2500 psi at 28 days.
 - 2. Slump Range: 8" minimum - 11" maximum.
 - 3. Aggregate size: 1/4" maximum for coarse grout.
 - 4. Provide fine grout at collar joints of brick veneer-on-block walls.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of unit masonry. Do not proceed with installation until unsatisfactory conditions have been corrected.
- B. Examine rough-in and built-in construction to verify actual locations of piping connections prior to installation.

3.2 INSTALLATION, GENERAL

- A. Build chases and recesses to accommodate items specified in this and other Sections of the Specifications.
- B. Leave openings for equipment to be installed before completion of masonry. After installing equipment, complete masonry to match construction immediately adjacent to the opening.
- C. Cut masonry units with motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide continuous pattern and to fit adjoining construction. Use full-size units without cutting, where possible. Allow units cut with water-cooled saws to dry

before placing, unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

- D. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. (30 g/194 sq. cm.) per minute when tested per ASTM C67. Allow units to absorb water so they are damp but not wet at time of laying.

3.3 CONSTRUCTION TOLERANCES

- A. Variation from Plumb: For vertical lines and surfaces of columns, walls, and arrises, do not exceed 1/4 inch in 10 feet, nor 3/8 inch in 20 feet, nor 1/2 inch in 40 feet or more. For external corners, expansion joints, control joints, and other conspicuous lines, do not exceed 1/4 inch in 20 feet, nor 1/2 inch in 40 feet or more. For vertical alignment of head joints, do not exceed plus or minus 1/4 inch in 10 feet, nor 1/2 inch maximum.
- B. Variation from Level: For bed joints and lines of exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines, do not exceed 1/4 inch in 20 feet, nor 1/2 inch in 40 feet or more. For top surface of bearing walls, do not exceed 1/8 inch in 10 feet, nor 1/16 inch within width of a single unit.
- C. Variation of Linear Building Line: For position shown in plan and related portion of columns, walls, and partitions, do not exceed 1/2 inch in 20 feet, nor 3/4 inch in 40 feet or more.
- D. Variation in Cross-Sectional Dimensions: For columns and thickness of walls, from dimensions shown, do not exceed minus 1/4 inch nor plus 1/2 inch.
- E. Variation in Mortar-Joint Thickness: Do not vary from bed-joint thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch. Do not vary bed-joint thickness from bed-joint thickness of adjacent course by more than 1/8 inch. Do not vary from head-joint thickness indicated by more than plus or minus 1/8 inch. Do not vary head-joint thickness from adjacent head-joint thickness by more than 1/8 inch.

3.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint widths and for accurate locating of openings, movement-type joints, returns, and offsets. Avoid the use of less-than-half-size units at corners, jambs, and where possible at other locations.
- B. Lay walls to comply with specified construction tolerances, with courses accurately spaced and coordinated with other construction.
- C. Bond Pattern for Exposed Masonry: Lay exposed masonry in the following bond pattern unless otherwise noted on drawings; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

1. One-half running bond with vertical joint in each course centered on units in courses above and below.
- D. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 2 inches. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
- E. Stopping and Resuming Work: In each course, rack back 1/2-unit length for one-half running bond; do not tooth. Clean exposed surfaces of set masonry, and remove loose masonry units and mortar prior to laying fresh masonry.
- F. Built-in Work: As construction progresses, build-in items specified under this and other Sections of the Specifications. Fill in solidly with masonry around built-in items.
- G. Fill space between hollow metal frames and masonry solidly with mortar, unless otherwise indicated.
- H. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core.
- I. Fill cores in hollow concrete masonry units with grout 24 inches under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.
- J. Build nonload-bearing interior partitions full height of story to underside of roof structure above and as follows:

3.5 MORTAR BEDDING AND JOINTING

- A. Lay hollow brick and concrete masonry units as follows:
 1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
 - a. Brick head joints shall be completely filled and formed by buttering all four sides of the ends of brick unit.
 - b. "Slushing" brick head joints is unacceptable.
 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.
 5. Maintain joint widths indicated, except for minor variations required to maintain bond alignment. If not indicated, lay walls with 3/8-inch joints.
- B. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.
- C. Cut joints flush for masonry walls that are to receive plaster or other direct-applied finishes (other than paint), unless otherwise indicated.

3.6 BRICK COLOR RANGE

- A. Lay brick in strict accordance with manufacturer's printed instructions to assure even distribution of color range.
- B. Mingle brick from two or more cubes unless otherwise directed by manufacturer.

3.7 BONDING OF MULTI-WYTHE MASONRY

- A. Use individual pintle ties installed in eyelets of horizontal joint reinforcing to bond wythes together. Provide ties spaced not to exceed 16" o.c. horizontally and 16" o.c. vertically. Stagger ties in alternate courses.
- B. At reinforced concrete columns, embed dovetail slots into concrete as indicated on drawings at 16 inches o.c. horizontally. Install dovetail anchors into slots at 16 inches o.c. vertically and extend into brick veneer.

3.8 CAVITIES

- A. Keep cavities clean of mortar droppings and other materials during construction.
- B. 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. Tape all joints with tape recommended by insulation manufacturer. Seal penetrations with sealant recommended by insulation manufacturer.
- C. Place cavity drainage material immediately above flashing in cavities to comply with manufacturer's installation requirements.

3.9 HORIZONTAL JOINT REINFORCEMENT

- A. General: Provide continuous horizontal-joint reinforcement as indicated. 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 reinforcing a minimum of 6 inches
 - 1. Space reinforcement not more than 16 inches o.c.
 - 2. Provide reinforcement in mortar joint 1 block course above and below wall openings and extending 12 inches beyond opening.
 - a. Reinforcement above is in addition to continuous reinforcement.
- B. Cut or interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.

- C. Provide continuity at corners and wall intersections by using prefabricated "L" and "T" sections. Cut and bend reinforcement units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.10 ANCHORING MASONRY TO STRUCTURAL MEMBERS

- A. Anchor masonry to structural members where masonry abuts or faces structural members to comply with the following:
 - 1. Provide an open space not less than 1 inch in width between masonry and structural member, unless otherwise indicated. Keep open space free of mortar or other rigid materials.
 - 2. Anchor masonry to structural members with flexible 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.

3.11 CONTROL AND EXPANSION JOINTS

- A. General: Install control and expansion joints in unit masonry where indicated. Build-in related items as the masonry progresses. Do not form a continuous span through movement joints unless provisions are made to prevent in-plane restraint of wall or partition movement.
- B. Form control joints in standard concrete masonry as follows:
 - 1. Install preformed control-joint gaskets designed to fit standard sash block.
- C. Form control joints in brick veneer as follows:
 - 1. Form open joint of width indicated, but not less than 3/8 inch for installation of sealant and backer rod specified in Division 7 Section "Joint Sealants". Keep joint free and clear of mortar.

3.12 LINTELS

- A. Install galvanized steel lintels where indicated. Provide minimum of 8" bearing at each end of lintel.
- B. Provide masonry lintels where shown and wherever openings of more than 1'-0" for brick size units and 2'-0" for block size units are shown without structural steel or other supporting lintels. Provide precast or formed-in-place masonry lintels. Cure precast lintels before handling and installation. Provide minimum of 8" bearing at each end of lintel.

3.13 FLASHING, WEEP HOLES, 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.
- B. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
- C. Install flashing as follows:
 - 1. At lintels and shelf angles, extend flashing a minimum of 4 inches into masonry at each end. At heads and sills, extend flashing 4 inches at ends and turn flashing up not less than 2 inches to form a pan.
- D. Install weep holes in the head joints in exterior wythes of the first course of masonry immediately above embedded flashing and as follows:
 - 1. Use wicking material to form weep holes.
 - 2. Space weep holes 16 inches o.c.
 - 3. Trim wicking material used in weep holes flush with outside face of wall after mortar has set.

3.14 INSTALLATION OF FILLED CELL MASONRY

- A. All filled cell masonry shall be built to preserve the unobstructed vertical continuity of the cells to be filled with grout.
- B. Units shall be laid with full face shell mortar beds. All head joints shall be continuously filled with mortar for a distance from the face of the wall or unit not less than the thickness of the longitudinal face shells. Cross webs adjacent to vertical cores to be filled shall be fully bedded with mortar to prevent leakage of grout.
- C. All mortar fins or other obstructions or debris shall be removed from the insides of the walls of the cells to be filled with grout. All cells to be filled shall be filled solidly with grout.
- D. Grouting: Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist grout pressure.
 - 1. Do not exceed the following pour heights for coarse grout:
 - a. For minimum widths of grout spaces of 1-1/2 inches or for minimum grout space of hollow unit cells of 1-1/2 by 3 inches, pour height of 12 inches.
 - b. For minimum widths of grout spaces of 2 inches or for minimum grout space of hollow unit cells of 2-1/2 by 3 inches, pour height of 60 inches.
 - c. For minimum widths of grout spaces of 2-1/2 inches or for minimum grout space of hollow unit cells of 3 by 3 inches, pour height of 12 feet
 - 2. Do not exceed the following pour heights for fine grout:

- a. For 1 inch wide collar joints between brick veneer and concrete block, pour height of 18 inches.
3. Provide saw-cut cleanout holes 4 inches by 4 inches for grout pours over 48 inches in height.
 - a. Provide cleanout holes at each vertical reinforcing bar.

3.15 INSULATION FOR SINGLE-WYTHE WALLS

- A. At single wythe masonry walls, pump foamed-in-place insulation into concrete block cores so as to fill void spaces completely. Limit lifts of insulation to one-story in height, but not-to-exceed 15'-0".

3.16 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or if units do not match adjoining units. Install new units to match adjoining units; install in fresh mortar or grout, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point-up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for application of sealants.
- C. In-Progress Cleaning: Clean unit masonry at least daily as work progresses by dry brushing to remove mortar fins and smears prior to tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 2. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2 applicable to type of stain present on exposed surfaces.
 3. Clean exposed brick surfaces as recommended by BIA Technical Notes 20 – "Cleaning Brickwork", using the bucket and brush hand cleaning method. Pressurized water cleaning is not acceptable.

END OF SECTION 042000

SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Framing with dimension lumber.
 - 2. Wood furring, grounds, nailers, and blocking.
 - 3. Plywood roof sheathing
- B. Related Sections include the following:
 - 1. Division 6 Section "Shop-Fabricated Wood Trusses."

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Keep materials under cover and dry. Protect from weather and contact with damp or wet surfaces. Stack lumber, plywood, and other panels. Provide for air circulation within and around stacks and under temporary coverings.

PART 2 - PRODUCTS

2.1 LUMBER, GENERAL

- A. Lumber Standards: Comply with DOC PS 20, "American Softwood Lumber Standard," and with applicable grading rules of inspection agencies certified by ALSC's Board of Review.
- B. Grade Stamps: Provide lumber with each piece factory marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.
- C. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
 - 1. Provide dressed lumber, S4S, unless otherwise indicated.
 - 2. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal thickness or less, unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. General: Where lumber or plywood is indicated as preservative treated or is specified to be treated, comply with applicable requirements of AWPA C2 (lumber) and AWPA C9 (plywood). Mark each treated item with the Quality Mark Requirements of an inspection agency approved by ALSC's Board of Review.
- B. Pressure treat aboveground items with waterborne preservatives to a minimum retention of 0.25 lb/cu. ft. After treatment, kiln-dry lumber and plywood to a maximum moisture content of 19 and 15 percent, respectively. Treat indicated items 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 floor plates installed over concrete slabs directly in contact with earth.
- C. Pressure treat wood members in contact with ground or freshwater with waterborne preservatives to a minimum retention of 0.40 lb/cu. ft.

2.3 DIMENSION LUMBER

- A. General: Provide dimension lumber of grades indicated according to the ALSC National Grading Rule (NGR) provisions of the inspection agency indicated.
- B. Light-Framing (2"-4" thick, 2"-4" wide): construction grade.
- C. Studs (2"-4" thick, 2"-6" wide, 12' and shorter): No. 2 structural light framing grade, Southern Yellow Pine graded under WWPA, WCLIB, SPIB, or NLGS rules.
- D. Structural Joists and Planks (2"-4" thick, 5" and wider): Any species and grade complying with requirements for allowable unit stresses.
 - 1. Fb (minimum extreme fiber stress in bending)...1,200 psi in single member.
 - 2. E (minimum modulus of elasticity).....1,600,000 psi
- E. Concealed Boards: Standard grade, any species graded under WWPA rules or No. 3 grade Southern Yellow Pine graded under SPIB rules.
- F. Lumber for Miscellaneous Uses: Unless otherwise indicated, provide Standard grade lumber for support of other work, including cant strips, bucks, nailers, blocking, furring, grounds, stripping and similar members.

2.4 MISCELLANEOUS LUMBER

- A. General: Provide lumber for support or attachment of other construction, including rooftop equipment curbs and support bases, cant strips, bucks, nailers, blocking, furring, grounds, stripping, and similar members.

- B. Fabricate miscellaneous lumber from dimension lumber of sizes indicated and into shapes shown.
- C. Moisture Content: 19 percent maximum for lumber items not specified to receive wood preservative treatment.
- D. Grade: For dimension lumber sizes, provide No. 3 or Standard grade lumber per ALSC's NGRs of any species. For board-size lumber, provide No. 3 Common grade per NELMA, NLGA, or WWPA; No. 2 grade per SPIB; or Standard grade per NLGA, WCLIB or WWPA of any species.

2.5 PLYWOOD ROOF SHEATHING

- A. APA Rated Plywood Roof Sheathing: Exposure 1 sheathing.
 - 1. Span Rating: Not less than 24/0.
 - 2. Thickness: Not less than 19/32 inch.

2.6 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacturer.
 - 1. For all rough carpentry related to roofing and roof accessories, provide fasteners with a hot-dip zinc coating per ASTM A 153 or of Type 304 stainless steel.
- B. Nails: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Discard units of material with defects that impair quality of rough carpentry and that are too small to use with minimum number of joints or optimum joint arrangement.
- B. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted.

- C. Fit rough carpentry to other construction; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds, and similar supports to allow attachment of other construction.
- D. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven staples, P-nails, and allied fasteners.
 - 2. Published requirements of metal framing anchor manufacturer.
 - 3. "Table 2304.9.1--Fastening Schedule," of the Florida Building Code.
- E. Use common wire nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; predrill as required.
- F. Use hot-dip galvanized or stainless-steel nails where rough carpentry is related to roofing or roof accessories, in ground contact, or in area of high relative humidity.

3.2 WOOD GROUNDS, NAILERS, BLOCKING, AND SLEEPERS

- A. Install wood grounds, nailers, blocking, and sleepers where shown and where required for screeding or attaching other work. Form to shapes shown and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated. Build into masonry during installation of masonry work. Where possible, anchor to formwork before concrete placement.
- C. Provide pressure treated wood grounds in gypsum drywall and plaster partitions for support of plumbing fixtures, toilet accessories, fire extinguisher cabinets and brackets, wall-mounted fixtures and furnishings, and hardware.
 - 1. Provide solid wood grounds, minimum 2 x 4 lumber, in all partitions scheduled to receive wall-mounted door bumpers. Position directly behind and centered on bumpers. Screw attach securely to metal studs.

3.3 WOOD FRAMING, GENERAL

- A. Framing Standard: Comply with AF & PA's "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Install framing members of size and at spacing indicated.
- C. Do not splice structural members between supports.

3.4 WOOD NAILERS, EDGING, AND BLOCKING FOR ROOF ACCESSORIES:

- A. Provide wherever shown and where required for attachment of other work. Form to shapes, as shown, and cut as required for true line and level on work to be attached. Coordinate location with other work involved.
- B. Where wood members are doubled, ends shall be lapped and thoroughly spiked to each other and to bearing members, maintaining structural integrity, using ring-shank nails.
- C. Where wood members abut concrete, securely fasten to same by bolts or lag screws on staggered centers. Heads of all bolts or lag screws shall be provided with large-head washers.
- D. Round corners of wood plates where flashing occurs.
- E. Make tight connections between members. Install fasteners without splitting of wood; pre-drill as required.
- F. Holes drilled oversized or wallowed out shall be redrilled.
- G. For fastening wood to:
 - 1. Metal. Countersunk flat head No. 10 self tapping, self drilling, metal screws, at 4" o.c., staggered; utilizing appropriate size bolt and nut where possible.
 - 2. Wood. Ring-Shank nails, 3/8" round heads at 12" o.c., staggered; 1-1/4" minimum substrate penetration.
 - 3. Plywood. Annular thread nails, 3/8" round heads at 8" o.c. staggered with full penetration.
 - 4. New Masonry or Concrete. 3/4" diameter by 12" long with 3" hook anchor bolts and Hughes WSH 1093 washers, spaced 2'-8" apart, staggered if nailer or blocking is wider than 6 inches.
 - 4. Existing Structural Concrete and Precast Concrete. Countersunk, flat head, threaded, self-tapping masonry screws ("Tapcons"), at 8" o.c., staggered; 1 1/2" minimum substrate penetration.

3.5 ROOF SHEATHING INSTALLATION

- A. Nail to wood trusses with nails of size and spacing indicated on structural drawings. Space panels 1/8" apart at edges and ends. Provide plywood dips.
- B. Refer to Structural Drawings for nailing requirements.

END OF SECTION 061000

SECTION 061753- SHOP-FABRICATED WOOD TRUSSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes wood roof trusses and truss accessories.
- B. Related Sections include the following:
 - 1. Division 6 Section "Rough Carpentry" for roof sheathing and dimension lumber for supplementary framing and permanent bracing.

1.3 DEFINITIONS

- A. Metal-Plate-Connected Wood Trusses: Planar structural units consisting of metal-plate-connected members fabricated from dimension lumber and cut and assembled before delivery to Project site.
- B. Lumber grading agencies, and the abbreviations used to reference them, include the following:
 - 1. NELMA - Northeastern Lumber Manufacturers Association.
 - 2. NLGA - National Lumber Grades Authority.
 - 3. SPIB - Southern Pine Inspection Bureau.
 - 4. WCLIB - West Coast Lumber Inspection Bureau.
 - 5. WWPA - Western Wood Products Association.

1.4 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal-plate-connected wood trusses capable of withstanding design loads within limits and under conditions indicated.
 - 1. Design Loads: As indicated.
 - 2. Maximum Deflection Under Design Loads:
 - a. Roof Trusses: Vertical deflection under total load of 1/240 of span.
 - b. Roof Trusses: Vertical deflection under live load of 1/360 of span.

1.5 SUBMITTALS

- A. Product Data: For metal-plate connectors, metal framing anchors, bolts, and fasteners.
- B. Shop Drawings: Show location, pitch, span, camber, configuration, and spacing for each type of truss required; species, sizes, and stress grades of lumber; splice details; type, size, material, finish, design values, orientation, and location of metal connector plates; and bearing details.
 - 1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional delegated "truss" engineer responsible for their preparation.
- C. Product Certificates: For metal-plate-connected wood trusses, signed by officer of truss fabricating firm.
- D. Qualification Data: For metal-plate manufacturer, professional engineer, fabricator, and Installer.

1.6 QUALITY ASSURANCE

- A. Metal Connector-Plate Manufacturer Qualifications: A manufacturer that is a member of TPI and that complies with TPI quality-control procedures for manufacture of connector plates published in TPI 1.
 - 1. Manufacturer's responsibilities include providing professional engineering services needed to assume engineering responsibility.
 - 2. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional delegated "truss" engineer.
- B. Fabricator Qualifications: Shop that participates in a recognized quality-assurance program that involves inspection by SPIB, Timber Products Inspection, TPI, or other independent testing and inspecting agency acceptable to Architect and authorities having jurisdiction.
- C. Source Limitations for Connector Plates: Obtain metal connector plates through one source from a single manufacturer.
- D. Comply with applicable requirements and recommendations of the following publications:
 - 1. TP1 1, "National Design Standard for Metal Plate Connected Wood Truss Construction."
 - 2. TPI DSB, "Recommended Design Specification for Temporary Bracing of Metal Plate Connected Wood Trusses."
 - 3. TPI HIB, "Commentary and Recommendations for Handling, Installing & Bracing Metal Plate Connected Wood Trusses."
- E. Wood Structural Design Standard: Comply with applicable requirements in AFPA's "National Design Specifications for Wood Construction" and its "Supplement."

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Comply with TPI recommendations to avoid damage and lateral bending. Provide for air circulation around stacks and under coverings.
- B. Inspect trusses showing discoloration, corrosion, or other evidence of deterioration. Discard and replace trusses that are damaged or defective.

1.8 COORDINATION

- A. Time delivery and erection of trusses to avoid extended on-site storage and to avoid delaying progress of other trades whose work must follow erection of trusses.

PART 2 - PRODUCTS

2.1 DIMENSION LUMBER

- A. Lumber: DOC PS 20 and applicable rules of lumber grading agencies certified by the American Lumber Standards Committee Board of Review.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. Provide dressed lumber, S4S, manufactured to actual sizes required by DOC PS 20 for moisture content specified.
 - a. Top chords must be 2 x 6, minimum.
 - 3. Provide a dry lumber with 19 percent maximum moisture content at time of dressing.
- B. Grade and Species: Provide visually graded dimension lumber for truss chord and web members, of the following grade and species:
 - 1. Grade for Chord Members: No. 2.
 - 2. Grade for Web Members: Same grade as indicated for chord members.
 - 3. Species: Southern Pine; SPIB.

2.2 METAL CONNECTOR PLATES

- A. General: Fabricate connector plates to comply with TPI 1 from metal complying with requirements indicated below:
- B. Hot-Dip Galvanized Steel Sheet: ASTM A 653/A 653M, G60 (Z180) coating designation; Designation SS, Grade 33, and not less than 0.036 inch (0.9 mm) thick.

2.3 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
 - 1. Where trusses are exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Nails: FS FF-N-105.
- C. Power-Driven Fasteners: NES NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Lag Bolts: ASME B18.2.1. (ASME B18.2.3.8M).
- F. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.

2.4 METAL FRAMING ANCHORS

- A. General: Provide framing anchors made from metal indicated, of structural capacity, type, and size indicated, and as follows:
 - 1. Research/Evaluation Reports: Provide products acceptable to authorities having jurisdiction and for which model code research/evaluation reports exist that show compliance of metal framing anchors, for application indicated, with building code in effect for Project.
 - 2. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from comprehensive testing performed by a qualified independent testing agency.
- B. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 (Z180) coating designation.
- C. Truss Tie-Downs (Hurricane Ties): As indicated on structural drawings.
- D. All truss-to-truss connectors shall be designed by the manufacturer's delegated truss engineer.

2.5 FABRICATION

- A. Cut truss members to accurate lengths, angles, and sizes to produce close-fitting joints.
- B. Fabricate metal connector plates to sizes, configurations, thicknesses, and anchorage details required to withstand design loads for types of joint designs indicated.

- C. Assemble truss members in design configuration indicated; use jigs or other means to ensure uniformity and accuracy of assembly with joints closely fitted to comply with tolerances in TPI 1. Position members to produce design camber indicated.
 - 1. Fabricate wood trusses within manufacturing tolerances in TPI 1.
- D. Connect truss members by metal connector plates located and securely embedded simultaneously in both sides of wood members by air or hydraulic press.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install wood trusses only after supporting construction is in place and is braced and secured.
- B. Before installing, splice trusses delivered to Project site in more than one piece.
- C. Hoist trusses in place by lifting equipment suited to sizes and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.
- D. Install and brace trusses according to TPI recommendations and as indicated.
- E. Install trusses plumb, square, and true to line and securely fasten to supporting construction.
- F. Space trusses 24 inches o.c.; adjust and align trusses in location before permanently fastening.
- G. Anchor trusses securely at bearing points; use metal framing anchors. Install fasteners through each fastener hole in metal framing anchor according to manufacturer's fastening schedules and written instructions.
- H. Securely connect each truss ply required for forming built-up girder trusses.
 - 1. Anchor trusses to girder trusses as indicated.
- I. Install and fasten permanent bracing during truss erection and before construction loads are applied. Anchor ends of permanent bracing where terminating at walls or beams.
- J. Install wood trusses within installation tolerances in TPI 1.
- K. Do not cut or remove truss members.
- L. Replace wood trusses that are damaged or do not meet requirements.
 - 1. Do not alter trusses in field.

M. Contractor is solely responsible for all truss bracing during construction.

END OF SECTION 06153

SECTION 064020 - PLASTIC LAMINATE CASEWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Extent of plastic laminate casework is indicated on Drawings. Work includes:
 - 1. Plastic laminate finished casework.
 - 2. Plastic laminate countertops.
 - 3. Solid-surfacing material countertops.
 - 4. Cabinet hardware.

1.3 SUBMITTALS

- A. Quality Certification: Submit manufacturer's (Fabricator's) certification, stating that the fabricated work complies with quality grades and other requirements indicated.
- B. Shop Drawings: Submit shop drawings showing location of each item, dimensioned plans and elevations, large scale casework sections and details, attachment devices, and other components.
- C. Cabinet hardware: one unit of each type and finish.
- D. Plastic laminate: manufacturer's sample chain.
- E. Solid-surfacing materials, 2 inches square.

1.4 QUALITY ASSURANCE

- A. AWI Quality Standard: Comply with applicable requirements of "Architectural Woodwork Standards, 1st Edition, 2009, Sections 10 and 11", published by the Architectural Woodwork Institute (AWI), except as otherwise indicated.
- B. Fabricator Qualifications: Casework fabricator shall have at least five years of documented experience in the fabrication and installation of commercial casework.
 - 1. Provide five (5) references which show that the casework fabricator has previous successful experience with commercial, plastic laminate casework. Include the name, address, and telephone numbers for the project Owner and General Contractor.

- C. Mockups: Build mockups, which may be at reduced size, of typical plastic laminate cabinets as shown on drawings, including at least one door and drawer with all operating hardware.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Protect casework during transit, delivery, storage and handling to prevent damage, soiling and deterioration.
- B. Do not deliver casework until painting, wetwork, grinding and similar operations which could damage, soil or deteriorate woodwork have been completed in installation areas. If, due to unforeseen circumstances, casework must be stored in other than installation areas, store only in areas meeting requirements specified for installation areas.

1.6 PROJECT CONDITIONS

- A. Conditioning: Installer shall advise Contractor of temperature and humidity requirements for casework installation areas. Do not install casework until required temperature and relative humidity have been stabilized and will be maintained in installation areas.
- B. Maintain temperature and humidity in installation area as required to maintain moisture content of installed casework within a 1.0 percent tolerance of optimum moisture content, from date of installation through remainder of construction period. The fabricator of casework shall determine optimum moisture content and required temperature and humidity conditions.
- C. Field measurements: Where casework is indicated to be fitted to other construction, check actual dimensions of other construction by accurate field measurements before manufacturing casework; show recorded measurements on approved shop drawings. Coordinate manufacturing schedule with construction progress to avoid delay of work.

1.7 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of work specified in other Sections to insure that cabinets can be supported and installed as indicated.
- B. Coordinate sizes and locations of electrical power and lighting components to insure correct locations on or within casework.

PART 2 - PRODUCTS

2.1 BASIC MATERIALS AND FABRICATION METHODS

- A. Plastic Laminate: Comply with NEMA LD-3 for type, thickness, color, pattern, and finish indicated for each application. Provide plastic laminate by one of the following; color selection by Architect.

1. Formica.
 2. Nevamar.
 3. Wilsonart.
- B. Acrylic Latex Sealant with Silicone: Colored acrylic latex caulk with silicone for sealing joints between casework and building and between countertops and backsplashes. Color shall be selected by Architect to match color of laminated plastic surfaces. All products used in this section shall comply with the limits for VOC content as described in Section 01352 paragraph 2.5. Verify the VOC content of the following products:
1. "Form Fill Adhesive Caulk".
 2. "ColorRITE Caulking Spectrum".
 3. "Color Flex"; Kampel.
- C. Lumber and Panel Materials: Comply with AWI Section 10 requirements for lumber and panel product requirements, unless specific core material is identified herein.
1. Panel materials for cabinet bodies, doors, drawer fronts, and countertops shall be softwood veneer core plywood, medium density particle board, or medium density fiberboard (MDF) used as a substrate for laminated plastic, per AWI requirements.
 - a. Plywood shall be made:
 - (1) 95% void-free.
 - (2) 3/4" thick / Seven (7) Ply.
 - (3) 3/8" thick / Three (3) Ply.
 - (4) Exposure I: Exterior waterproof glue.
 - (5) Classification: APA Group I, (Fir, Odorless Virola)
 - (6) Appearance Grades: (Installation Applications)
 - A-A Exposed & Semi-Exposed Surface Laminate Base: Two (2) Sides
 - A-C Exposed & Semi-Exposed Surface Laminate Base / Concealed Surface Laminate Base
- D. Solid-Surfacing Material: Homogenous solid sheets of quartz-based fabricated stone.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Caesarstone USA, Inc.: "Caesarstone."
 - b. Cambria: "Cambria"
 - c. Cosentino: "Silestone."
 - d. E.I. du Pont de Nemours and Company: "Zodiaq."
 2. Type: Standard type.
 3. Colors and Patterns: As selected by Architect from manufacturer's full range.
 4. Finish: Polished.
- E. Design and Construction Features: Comply with details shown for profile and construction of casework; and, where not otherwise shown, comply with applicable quality standards.

- F. Shop-Cut Openings: Fabricate casework with shop-cut openings, where possible, to receive hardware, appliances, plumbing fixtures, electrical work and similar item openings accurately and use templates or roughing-in diagrams for proper size and shape. Smooth edges of cutouts and, where located in countertops and similar exposures, seal edges with a water-resistant coating.

2.2 PLASTIC LAMINATE FINISHED CASEWORK

- A. Grade: AWI Custom Grade.
- B. Cabinet Construction: Flush overlay, conforming to AWI Section 400-G-7. Conform to the following requirements:
1. Cabinet Body Sides, Dividers, Tops, Bottoms, Fixed Shelves and Stretchers: Not less than 3/4" thick. Provide stretchers at top of base cabinet.
 2. All adjustable shelves shall be constructed using minimum 3/4" thick 9-ply Luan veneer plywood. Shelves shall have GP-50 type laminated plastic on both faces, and it shall be applied in the same machine direction on both faces. Shelves shall be edge banded with GP-50 type laminated plastic on all 4 sides.
 3. Backs: Not less than 1/4" thick.
 4. Drawer Fronts: Not less than 3/4" thick.
 5. Drawers: Sides, subfronts and backs: Not less than 1/2" thick; bottoms: not less than 1/4" thick. Provide box type construction with front, bottom and back lock shouldered in sides and secured with glue and mechanical fasteners.
 6. Doors: Not less than 3/4" thick.
 - a. Provide plastic-laminate finished, 1 3/8 inch thick, hollow core wood doors at Bunk Lockers as indicated on drawings.
 - (1) Grade: Custom.
 - (2) Plastic-Laminate Faces: High-pressure decorative laminates complying with NEMA LD3, Grade HGS (.048 inch thick).
 - (3) Colors, Patterns, and Finishes: As selected by Architect from laminate manufacturer's full range of products.
 7. Door and Drawer Front Edge Banding: PVC edge banding, 3mm. thick, matching laminate in color, pattern, and finish.
 8. Joinery: Rabbet backs flush into end panels and secure with concealed mechanical fasteners. Connect wall cabinet tops and bottoms and base cabinet bottoms and stretchers to ends and dividers by means of mechanical fasteners. Rabbet tops, bottoms and backs into end panels.
 9. Subbase: Not less than 1-1/2" thick, 4-1/2" high, recessed 2-1/2" from cabinet fronts and exposed ends. Cover with base as scheduled on drawings.
 10. All base and wall cabinets wider than 36 inches shall have a full height center divider. Omit divider in base cabinets containing sinks.
- C. Exposed Surfaces: Provide high pressure laminate in grades indicated for the following types of surfaces:
1. Horizontal surfaces: GP-50 (0.050" nominal thickness).

2. Vertical Surfaces: GP-28 (0.028" nominal thickness). Doors must have same laminate on both faces.
- D. Semi-Exposed Surfaces: Finish semi-exposed surfaces as follows, unless otherwise indicated.
1. Plastic laminate, CL-20; white in color.
- E. Concealed Surfaces: Finish concealed surfaces without plastic laminate with two coats of shellac or clear sanding sealer.
- F. Fabricate all exposed edges of casework, including edges of doors and drawers when open, with matching plastic laminate.

2.3 PLASTIC LAMINATE COUNTERTOPS

- A. General: Except as otherwise indicated, provide separate plastic laminate countertops (installed on other casework or other support system as indicated) to comply with requirements for casework for plastic laminate finish.
- B. Grade: AWI custom grade.
- C. Standard .02" phenolic back-up sheet required wherever unsupported area exceeds 6 sq. ft. and core is 3/4" thick; 8 sq. ft. and core is 1" thick; 10 sq. ft. and core is 1-1/8" or thicker.
- D. Wire Management Grommets: Provide where indicated on drawings.
1. Grommet sets shall include a plastic grommet to fit a 2" diameter hole, with a retractable, self-storing slot cover. Color: black.
 2. Manufacturer: Outwater Plastics Industries, Inc., part #31 BK, or Doug Mockett & Company, Inc., part no. TG.

2.4 SOLID SURFACING – MATERIAL COUNTERTOPS

- A. Grade: Custom
- B. Solid Surfacing – Material Thickness: 3/4 inch.
- C. Fabricate tops in one piece, unless otherwise indicated. Comply with solid-surfacing-material manufacturer's written recommendations for adhesives, sealers, fabrication, and finishing.
1. Fabricate tops with shop-applied edges of materials and configuration indicated.
 2. Fabricate tops with loose backsplashes for field application where indicated on drawings.
- D. Drill holes in countertops for plumbing fittings in shop.

2.5 CABINET HARDWARE

- A. General: Provide cabinet hardware and accessory materials associated with architectural woodwork, except for units which are specified as "door hardware" in other sections of these specifications.
- B. Hardware Standards: Except as otherwise indicated, comply with ANSI A156.9 "American National Standard for Cabinet Hardware".
 - 1. Quality Level: Type 2 (institutional), unless otherwise indicated.
 - 2. Quality Certification: Where available, provide cabinet hardware bearing the BHMA certification label, affixed either to hardware or its packaging, showing compliance with BHMA Cabinet Hardware Standard 201.
- C. Cabinet Hardware Schedule: Refer to schedule included as last pages of this section for specific hardware and accessory items required for casework.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Condition casework to average prevailing humidity conditions in installation areas prior to installing.
- B. Deliver concrete inserts and similar anchoring devices to be built into substrates well in advance of time substrates are to be built.
- C. Prior to installation of casework, examine shop fabricated work for completion, and complete work as required, including removal of packing.

3.2 INSTALLATION

- A. Installer: The installation of all work of this section shall be by the fabricator of the plastic laminate casework.
- B. Install the work plumb, level, true and straight with no distortions. Shim as required using concealed shims. Install to a tolerance of 1/8" in 8'-0" for plumb and level (including countertops).
- C. Scribe and cut work to fit adjoining work, and refinish cut surfaces or repair damaged finish at cuts.
- D. Anchor casework to anchors or blocking built-in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing as required for a complete installation.
- E. Install without distortion so that doors and drawers will fit openings properly and be accurately aligned. Adjust hardware to center doors and drawers in openings and to

provide unencumbered operation. Complete the installation of hardware and accessory items as indicated.

- F. Countertops: Anchor securely to base units and other support systems as indicated.
 - 1. Align adjacent solid-surfacing-material countertops and form seams to comply with manufacturer's written recommendations using adhesive in color to match countertop. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
 - 2. Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
- G. Sealant: Caulk exposed joints between casework and building and between laminated plastic countertops and backsplashes with colored acrylic latex caulk with silicone. Color shall be selected by Architect to match color of laminated plastic surfaces.

3.3 ADJUSTMENT, CLEANING, FINISHING AND PROTECTION

- A. Repair damaged and defective casework wherever possible to eliminate defects functionally and visually; where not possible to repair properly, replace casework. Adjust joinery for uniform appearance.
- B. Clean hardware, lubricate and make final adjustments for proper operation.
- C. Clean casework on exposed and semi-exposed surfaces.
- D. Protection: Installer of casework shall advise Contractor of procedures required to protect casework during remainder of construction period to ensure that work will be without damage or deterioration at time of acceptance.

3.4 CABINET HARDWARE SCHEDULE

- A. Finish: Of all hardware shall be US26 polished chrome unless noted otherwise.
- B. Manufacturers: Provide products by the following manufacturers or approved equal.
 - 1. Adjustable shelving supports - K & V (Knappe & Vogt), #345, for 5 mm hole; nickel-plated steel.
 - 2. Hinges – 5 knuckle, 2-3/4" reveal overlay type with hospital tips and adjustable screw holes – Rockford #375, or Weber Knapp #M25R4-0-9-091. Provide US26 dull chrome finish.
 - 3. Catches - Stanley #SP41, magnetic type (US28).
 - 4. Pulls – Sugatsune America #SWP-640/S 4" Wire Pull, 316 stainless steel, satin finish.

- 5. Drawer Slides - Knap & Vogt No. 8400 (100 lbs.) telescoping full extension with ball bearings; anachrome finish cold rolled steel.
- 6. File Drawer Slides - Knap & Vogt No. 8400 (100 lbs.) telescoping full extension with ball bearings; anochrome finish cold rolled steel.
- 7. File Drawer File Brackets – Kinetron Corporation Kine Flex file bracket system #KHFB with top mount movable brackets that slide over edge of drawer frame, and 5/8” file bars. Provide 1 set per drawer.
- 8. Lazy Susans – Rev-A-Shelf #RAS-5472-32-CR, 32” Diameter Kidney Lazy Susan 2-Shelf Set, polished chrome steel, with telescoping shaft. No Substitutions.
- 9. Locks - Key operated, pin tumbler, dead bolt type. Provide National Locks or Corbin Cabinet Lock, US 26 finish.
- 10. Drawers:
 - 1 set.....Slides.....8400
 - 1.....Pull.....SWP-640/S
 - 1.....Lock..... (where indicated on drawings: National C8179)
- 11. Cabinet Doors (single):
(Doors 48" high and over shall carry 3 or more hinges per door)
 - 1 pair.....Hinge.....375
 - 1.....Catch.....41
 - 1.....Pull.....SWP-640/S
 - 1.....Lock.....(where indicated on drawings: National C8173 x strike)
- 12. Cabinet Doors (pairs):
(Doors 48" high and over shall carry 3 or more hinges per door.)
 - 2 pair.....Hinges.....375
 - 2.....Catch.....41
 - 2.....Pulls.....SWP-640/S
 - 1.....Lock.....(where indicated on drawings: National C8173 x strike)
- 13. Bunk Locker Doors:
 - 2 pair.....Hinges.....7036
 - 1.....Catch.....41
 - 1.....Pull.....EC-100/M
 - 1.....Lock.....National C8173 (7/8” cylinder length) x strike.
- 14. Door Locks
 - a. Key all personnel lockers individually. Provide 2 keys per lock; provide master key system.

15. Coat Hooks for Personnel Lockers: Sugatsune America, Inc. polished stainless steel hook No. EL-25. Provide one hook on inside of every personnel locker door; mount at same height as clothes rod and center hook on door. Secure with stainless steel screws.
16. Clothes Rods for Personnel Lockers: Knappe and Vogt No. 750-1 chrome-look round steel tubing, 1-1/16" O.D.; wall thickness .075". Mounting Flanges: Knappe and Vogt No. 734 CHR – chrome-look finish.

END OF SECTION 064020

SECTION 071800 – POLYURETHANE DECK COATING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes polyurethane waterproofing coating system where indicated on the Drawings.

1.3 SUBMITTALS

- A. Product data:
 - 1. Manufacturer's specifications and other data needed to prove compliance with the specified data.
 - 2. Manufacturer's current recommended installation procedures which, when reviewed by Architect, will become the basis for accepting or rejecting actual installation procedures used on the Work.
 - 3. Written documentation of applicator's qualifications, including reference projects of similar scope and complexity, with current phone contacts of architects and owners for verification.

1.4 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen thoroughly trained and experienced in the necessary crafts and completely familiar with the specified requirements and methods needed for proper performance of the work of this Section.
- B. Applicator Qualifications:
 - 1. Applicator shall have at least three years experience in installing materials of types specified and shall have successfully completed at least three projects of similar scope and complexity.
 - 2. Applicator shall designate a single individual as project foreman who shall be on site at all times during installation.
- C. Convene a pre-installation job-site conference four weeks prior to commencing work of this Section:
 - 1. Secure attendance by Architect, contractor, applicator, and authorized representatives of the coating system manufacturer and interfacing trades.

2. Examine Drawings and Specifications affecting work of this Section, verify all conditions, review installation procedures, and coordinate scheduling with interfacing portions of the Work.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to job site in manufacturer's unopened containers with all labels intact and legible at time of use.
- B. Maintain the products in accordance with manufacturer's recommendations with proper precautions to ensure fitness of material when installed.

1.6 SUBSTRATE CONDITIONS

- A. General:
 1. Provide applicator with surfaces that are broom clean, dry, sound and free of voids, bugholes, rockpockets, honeycombs, protrusions, excessive roughness, foreign matter, and other contaminants which may inhibit application or performance of the waterproofing coating system.
 2. Using suitable abrasive methods, remove residue of curing compound, chemical retarders and other surface treatments, laitance, mortar smear, sawcutting residue, loose material and other contaminants from concrete surfaces to receive the work of this Section.
- B. Concrete: Provide surfaces that are smooth with finish equal to one that is light steel troweled followed by a fine hair broom.

1.7 WARRANTY

- A. Deliver to the Architect signed copies of the following written warranties against defective materials and workmanship for a period of two years following date of Substantial Completion. Warrant that installed coating system shall be free of defects including adhesive failure, cohesive failure, weathering deficiencies and waterproofing failure resulting from substrate cracking up to 1/16 inch.
 1. Manufacturer's standard warranty covering materials.
 2. Applicator's standard warranty covering workmanship.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Provide a complete liquid applied polyurethane waterproofing coating system having the following minimum attributes:

1. System designed for waterproofing decks subject to pedestrian traffic.
2. Comply with ASTM C957-91 and provide a Class A fire rating on concrete substrates.
3. Color to be selected by Architect from manufacturer's standard color range.
4. Acceptable products:
 - a. Vulkem 350/351 (No Substitutions)

2.2 ACCESSORIES

- A. Primer: As recommended by coating system manufacturer.
- B. Aggregate: 40-50 mesh silica sand; local aggregate approved by coating manufacturer

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.
- B. Applicator shall examine the areas and conditions under which work of the Section will be performed.
 1. Verify conformance with manufacturer's requirements.
 2. Report unsatisfactory conditions in writing to the Architect.
 3. Do not proceed until unsatisfactory conditions are corrected.

3.2 PREPARATION

- A. Surface preparation and detailing procedures to be in accord with waterproof coating system manufacturer's instructions and recommendations except where more stringent requirements are indicated.
- B. Clean all deck surfaces to receive coating system in accord with manufacturer's instructions; vacuum clean or blow clean with oil-free compressed air all surfaces to receive sealants, detailing materials or coatings immediately prior to installation.
- C. Rout, clean, prepare and detail surface cracks in accord with manufacturer's instructions; install backer rod where required.
- D. Install ¼" diameter backer rod into corner of all horizontal-to-vertical junctures and cover with one inch detail cant of "Vulkem 921" polyurethane sealant.
- E. Prime surfaces in accord with manufacturer's instructions.

3.3 APPLICATION

- A. Install waterproof coating system in accordance with manufacturer's recommendations and instructions as applies to the Work except where more stringent requirements are indicated.
 - 1. Grid deck surfaces to assure proper coverage rates and verify coating wet-film mil thickness with gauges as work progresses.
 - 2. Retain empty product containers during course of work to aid in determining whether completed coating system complies with manufacturers average thickness requirements.
- B. Verify proper dry condition of substrate using method recommended by coating system manufacturer; perform adhesion checks prior to general application of coating system using field adhesion test method recommended by manufacturer.
- C. Mask off adjoining surfaces not to receive coating system, including all surrounding walls above 4 inch wall base.
- D. Wipe clean all detail coats with white rags wetted with Xylene solvent; do not saturate detail coat.
- E. Apply coating base coat uniformly and allow to cure in accord with manufacturer's instructions.
- F. Feather edge when entire area cannot be completed in one day; clean area 6" wide along edge of coating with Xylene solvent on clean white rags prior to startup on next working day; use interlaminary primer per manufacturer's instructions as needed; overlap existing work by 6" with new work.
- G. Apply coating system finish coat in accordance with manufacturer's instructions.
 - a. Immediately broadcast aggregate into wet material at rate recommended by manufacturer and backroll to evenly distribute and totally encapsulate.
 - b. Allow to cure per manufacturer's instructions.
- H. Extend deck coating system 4" above slab to create an integral wall base.

3.4 PROTECTION AND CLEAN-UP

- A. Promptly remove primer or coating material from adjacent surfaces with MEK, Toluene or Xylene; leave work area in broom clean condition.
- B. Allow completed Work to cure 24 hours before opening to pedestrian traffic.

END OF SECTION 071800

SECTION 072100 - BUILDING INSULATION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Concealed thermal building insulation.
 - 3. Concealed acoustical building insulation.
- B. Related Sections include the following:
 - 1. Division 4 Section "Unit Masonry Assemblies" for foamed-in-place masonry wall insulation and cavity wall insulation.

1.3 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product Data for each type of insulation product specified.

1.4 QUALITY ASSURANCE

- A. Single-Source Responsibility for Insulation Products: Obtain each type of building insulation from a single source with resources to provide products complying with requirements indicated without delaying the Work.
- B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated on Drawings or specified elsewhere in this Section as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
 - 1. Surface-Burning Characteristics: ASTM E 84.
 - 2. Fire-Resistance Ratings: ASTM E 119.
 - 3. Combustion Characteristics: ASTM E 136.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.
- B. Protect plastic insulation as follows:
 - 1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
 - 2. Protect against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.
 - 3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide insulation products by one of the following:
 - 1. Glass-Fiber Blanket Insulation
 - a. CertainTeed Corporation
 - b. Guardian Building Products, Inc.
 - c. Johns Manville Corporation
 - d. Knauf Fiber Glass
 - e. Owens Corning
 - 2. Slag-Wool / Rock-Wool Fiber Sound Attenuation Insulation:
 - a. Fibrex Insulations, Inc.
 - b. Owens Corning
 - c. Roxul Inc.
 - d. Thermafiber

2.2 INSULATING MATERIALS

- A. General: Provide insulating materials that comply with requirements and with referenced standards.
- B. Faced, Glass-Fiber Blanket (Batt) Insulation: ASTM C 665, Type II (Blankets with kraft paper vapor retarder membrane facing on one face), Class C. Provide blankets with R-19 rating, approximately 6.25" thick.
- C. Unfaced Mineral-Fiber Blanket Insulation: Sound attenuation insulation combining mineral fibers of type described below with thermosetting resins to comply with ASTM C 665, Type I (blankets without membrane facing).

1. Mineral-Fiber Type: Fibers manufactured from slag wool or rock wool.
2. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indices of 25 and 50, respectively.
3. Thickness: 3", unless otherwise indicated on drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements of Sections in which substrates and related work are specified and to determine if other conditions affecting performance of insulation are satisfactory. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates of substances harmful to insulations or vapor retarders, including removing projections capable of puncturing vapor retarders or that interfere with insulation attachment.

3.3 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and application indicated.
- B. Install insulation that is undamaged, dry, and unsoiled.
- C. Extend insulation in thickness indicated 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. Apply insulation to produce thickness indicated.

3.4 INSTALLATION OF GENERAL BUILDING INSULATION

- 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 Blanket Insulation: Install as follows:
 1. Set kraft facing toward plywood roof sheathing.

2. Place blankets in cavities formed by framing members to produce a friction fit between edge of insulation and framing members.
 - a. Provide galvanized chicken wire as required to hold insulation in place between roof trusses.

C. Slag-Wool / Rock-Wool Fiber Sound Attenuation Insulation

1. Install in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.

3.5 PROTECTION

- A. General: Protect installed insulation and radiant barriers from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 072100

SECTION 074113 - METAL ROOF PANELS

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Standing-seam metal roof panels installed on plywood decks.
 - 2. Standing-seam metal fascia panels installed on plywood decks.
 - 3. Flush-panel metal soffit panels.
 - 4. Metal hat channels for soffit panel attachment.
 - 5. Installer-fabricated gutters and downspouts
 - 6. Concealed fastenings, flashings, edge metal, trim, cleats, sealants, filler, etc. required for a complete, weathertight installation.
- B. Base and counterflashing at roof-wall intersection is specified in Section 076200 – Sheet Metal Flashing and Trim.

1.3 DEFINITIONS

- A. Metal Roof Panel Assembly: Metal roof panels, attachment system components, miscellaneous metal framing, and accessories necessary for a complete, weathertight roofing system.

1.4 PERFORMANCE REQUIREMENTS

- A. General Performance: Metal roof panels shall comply with performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction.
- B. Delegated Design: Design metal roof panel assembly, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- C. Air Infiltration: Air leakage through assembly of not more than 0.06 cfm/sq. ft. of roof area when tested according to ASTM E 1680 at the following test-pressure difference:
 - 1. Test-Pressure Difference: Positive and negative 1.57 lbf/sq. ft.
 - 2. Positive Preload Test-Pressure Difference: Greater than or equal to 15.0 lbf/sq. ft. and the greater of 75 percent of building live load or 50 percent of building design positive wind-pressure difference.
 - 3. Negative Preload Test-Pressure Difference: 50 percent of design wind-uplift-pressure difference.

- D. Water Penetration: No water penetration when tested according to ASTM E 1646 at the following test-pressure difference:
1. Test-Pressure Difference: No water penetration at 20 lbf/sq.ft.
 2. Positive Preload Test-Pressure Difference: Greater than or equal to 15.0 lbf/sq. ft. and the greater of 75 percent of building live load or 50 percent of building design positive wind-pressure difference.
 3. Negative Preload Test-Pressure Difference: 50 percent of design wind-uplift-pressure difference.
- E. Wind-Uplift Resistance: Provide metal roof and fascia panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.
1. Uplift Rating: UL 90.
- F. Provide panels that comply with the requirements of the Florida Building Code and which carry Florida Product Approval numbers.
- G. Structural Performance: Provide metal roof panel assemblies capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated, based on testing according to ASTM E 1592:
- H. Wind Loads: Provide roof, fascia, and soffit panel systems including anchorage capable of withstanding wind load design pressures calculated according to the requirements of ASCE 7-10.
1. Design wind velocity (V-ult.) = 155 MPH.
 2. Risk Category IV.
 3. Exposure C.
 4. Maximum allowable panel deflection = 1/180.
 5. Apply appropriate load combination from FBC 2014, 1605.3 for comparison to allowable (V-asd) values.
 - a. Roof panel ultimate design pressures are as follows. Apply a load factor of .6 to calculate allowable design pressures.
 - 1) MAIN ROOF
 - a) Zone 1 (Main Roof): - 53.6 psf
 - b) Zone 2 (Perimeter): - 93.2 psf (5'-0" Edge Zone)
 - c) Zone 3 (Corners): - 93.2 psf
 - 2) CLOSED OVERHANGS AND CANOPIES
 - a) Zone 2 (Perimeter): - 93.2 psf
 - b) Zone 3 (Corners): - 93.2 psf
 - 3) Positive pressure throughout all zones = +33.7 psf
 - b. Soffit panel ultimate design pressure is: 74.8 psf, typical. Apply load factor of .6.

- I. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes. 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.
- J. Solar Reflectance Index: Not less than 29 when calculated according to ASTM E 1980 based on testing identical products by a qualified testing agency.

1.5 SUBMITTALS

- A. Product Data: For each type of product indicated, include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of roof panel and accessory.
- B. LEED Submittals:
 - 1. Product Test Reports for LEED for New Construction Version 3.0, Credit SS 7.2: For roof panels, indicating that panels comply with solar reflectance index requirement.
 - 2. Product Data for Credit MR 4: Indicating percentages by weight of postconsumer and preconsumer recycled content for products having recycled content. Include statement indicating cost for each product having recycled content.
- C. Shop Drawings: Show fabrication and installation layouts of metal roof panels; details of edge conditions, side-seam and endlap joints, panel profiles, corners, anchorages, trim, flashings, closures, and accessories; and special details. Distinguish between factory- and field-assembled work.
 - 1. Accessories: Include details of the following items, at a scale of not less than 1-1/2 inches per 12 inches:
 - a. Flashing and trim.
 - b. Gutters.
 - c. Downspouts
- D. Samples for Initial Selection: For each type of metal roof, fascia, and soffit panel indicated with factory-applied color finishes.
 - 1. Include similar Samples of trim and accessories involving color selection.
- E. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
 - 1. Metal Roof Panels: 12 inches long by actual panel width. Include fasteners, clips, closures, and other metal roof panel accessories.
 - 2. Metal Fascia Panels: 12 inches long by actual panel width. Include fasteners, clips, closures, and other metal fascia panel accessories.

3. Metal Soffit Panels: 12 inches long by actual panel width. Include fasteners, clips, closures, and other metal soffit panel accessories.
 4. Trim and Closures: 12 inches long. Include fasteners and other exposed accessories.
 5. Accessories: 12-inch- long Samples for each type of accessory.
- F. Delegated-Design Submittal: For metal roof, fascia, and soffit panel assemblies indicated to comply with performance requirements and design criteria, including analysis data with exact clip spacing and anchorage signed and sealed by the qualified Florida professional engineer responsible for their preparation.
- G. Qualification Data: For qualified Installer.
- H. State of Florida Product Approval number.
- I. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.
- J. Field quality-control reports.
- K. Maintenance Data: For metal roof fascia, and soffit panels to include in maintenance manuals.
- L. Warranties: Samples of special warranties.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
1. Panel installer shall have a minimum of three (3) years experience in the installation of concealed clip architectural standing seam metal roofing and show evidence of successful completion of at least three (3) projects of similar size, scope, and complexity.
 2. Must be State of Florida certified roofing/sheet metal contractor.
- B. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.
- C. Source Limitations: Obtain each type of metal roof panels from single source from single manufacturer.
- D. Preinstallation Conference: Conduct conference at Project site.
1. Meet with Owner, Architect, metal roof panel installer, metal roof panel manufacturer's representative, lightning protection system installer, and installers whose work interfaces with or affects metal roof panels including installers of roof accessories and roof-mounted equipment.
 2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

3. Review methods and procedures related to metal roof panel, fascia panel, and soffit panel installation, including manufacturer's written instructions.
4. Examine deck substrate conditions for compliance with requirements, including flatness and attachment to structural members.
5. Review structural loading limitations of deck during and after roofing.
6. Review flashings, special roof details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect metal roof panels.
7. Review governing regulations and requirements for insurance, certificates, and testing and inspecting if applicable.
8. Review temporary protection requirements for metal roof panel assembly during and after installation.
9. Confirm schedule for roof inspections (minimum of three) to be made by roof panel manufacturer.
10. Review roof observation and repair procedures after metal roof panel installation.
11. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, sheets, metal roof panels, and other manufactured items so as not to be damaged or deformed. Package metal roof panels for protection during transportation and handling.
- B. Unload, store, and erect metal roof panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal roof panels on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal roof panels to ensure dryness. Do not store metal roof panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Protect strippable protective covering on metal roof panels from exposure to sunlight and high humidity, except to extent necessary for period of metal roof panel installation.

1.8 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit metal roof panel work to be performed according to manufacturer's written instructions and warranty requirements.
- B. Field Measurements: Verify actual dimensions of construction contiguous with metal roof panels by field measurements before fabrication.

1.9 COORDINATION

- A. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.
- B. Coordinate metal roof panels with rain drainage work, flashing, trim, and construction of decks, walls, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.10 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace metal roof panel assemblies 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 roof 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: Twenty years from date of Substantial Completion.
- C. Special Weathertightness Warranty for Standing-Seam Metal Roof and Fascia Panels: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.
 - 1. Warranty Period: Twenty years from date of Substantial Completion.
 - 2. Warranted Wind Velocity: 155mph (V-ult. per 2014 Florida Building Code) with no exemptions or exclusions. Wind velocity, or loads noted in 1.4 - Performance Requirements, shall be noted in writing on the warranty document.

PART 2 - PRODUCTS

2.1 ROOF, FASCIA, AND SOFFIT PANEL MATERIALS

- A. Aluminum Sheet: Coil-coated sheet, ASTM B 209, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.
 - 1. Surface: Smooth, flat finish.
- B. Panel Sealants:
 - 1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
 - 2. Joint Sealant: ASTM C 920; elastomeric polyurethane, polysulfide, or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal roof panels and remain weathertight; and as recommended in writing by metal roof panel manufacturer.
 - 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

2.2 ROOF AND FASCIA UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Underlayment: 30 to 40 mils thick minimum, consisting of slip-resisting, polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. 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. Carlisle: WIP 300HT
 - b. Grace Construction Products; Ice and Water Shield HT.
 - c. Henry Company; Blueskin PE200 HT.
 - d. IMETCO; Aqua-Block-50
 - e. Metal-Fab Manufacturing, LLC; MetShield.
 - f. Owens Corning; WeatherLock Metal High Temperature Underlayment.
 - g. Polyglass: Polystick MTS.

2.3 MISCELLANEOUS MATERIALS

- A. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.4 STANDING-SEAM METAL ROOF PANELS

- A. Vertical-Rib, Seamed-Joint, Standing-Seam Metal Roof Panels: Formed with vertical ribs at panel edges and flat pan between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels and engaging opposite edge of adjacent panels, and mechanically seaming panels together.
- B. 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 weathertight installation.
 - 1. Aluminum Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E 330 and E 331.
 - 2. Subject to compliance with requirements, provide one of the following:
 - a. "Stand 'N Seam Metal Roofing", Fabral.
 - b. "Zip-Loc Standing Seam Panel", Merchant & Evans, Inc.
 - c. "Tite-Loc Plus", Petersen Aluminum Corporation.
 - 3. Material: Aluminum sheet, 0.032-inch thick.
 - a. Exterior Finish: Metallic fluoropolymer.
 - b. Color: As selected by Architect from manufacturer's full range.
 - 4. Joint Type: As standard with manufacturer.
 - a. Where joint includes a batten cap, the cap shall be run continuous, without seams or joints, for the full length of the adjoining panels. Caps shall be same material, thickness, finish, and color as roof panels.
 - 5. Panel Coverage: 12 inches.
 - 6. Panel Height: 2 – 2.5 inches.
 - 7. Clips: Stainless steel; two-piece type to accommodate expansion and contraction of roof panels.

2.5 STANDING SEAM METAL FASCIA PANELS

- A. Vertical-Rib, Snap-Joint, Standing-Seam Metal Roof Panels: Formed with vertical ribs at panel edges and a flat pan between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels, engaging opposite edge of adjacent panels, and snapping panels together.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. "Thin Seam", Fabral.
 - b. "PS-305", Merchant & Evans
 - c. "Snap-Clad Panels", Petersen Aluminum Corporation
2. Aluminum Sheet: Coil-coated sheet, ASTM B 209, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.
 - a. Panel width: 12 inches.
 - b. Thickness: 0.032-inch.
 - c. Surface: Smooth, flat finish.
 - d. Exterior Finish: Metallic fluoropolymer.
 - e. Color: As selected by Architect from manufacturer's full range.
3. Clips: Stainless steel: one or two-piece type as standard with panel manufacturer.

2.6 FLUSH PANEL METAL SOFFIT PANELS

- A. Flush-Profile Metal Soffit Panels: Designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners in side laps. Solid panels shall be formed with vertical panel edges and a flat plan between panel edges; with flush joint between panels.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. "Décor-Flush", Fabral.
 - b. "PS-11 Flush", Merchant & Evans
 - c. "Flush Panels", Petersen Aluminum Corporation
 2. Material: 0.040-inch aluminum sheet; same finish, and color as metal roof and fascia panels.
 3. Panel width: 12 inches.
- B. Miscellaneous Metal Subframing: ASTM C 645, cold-formed metallic-coated steel sheet, G90 galvanized coating designation; 7/8" high x 2-9/16" wide; 20 gage.
- C. Panel Fasteners: Self tapping and self-drilling screws sized per panel manufacturers' recommendations.

2.7 ACCESSORIES

- A. Roof Panel Accessories: Provide components approved by roof panel manufacturer and as required for a complete metal roof panel assembly including trim, copings, fasciae, corner units, ridge closures, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels unless otherwise indicated.
1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal roof panels.
 2. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch thick, flexible.
 3. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
- B. Flashing and Trim: Formed from same material as roof panels, prepainted with coil coating, minimum .040 inch thick. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal roof panels.

2.8 FABRICATION, GENERAL

- A. Fabricate and finish metal roof, fascia, and soffit panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes and as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.
- B. Provide panel profile, including major ribs for full length of panel.
- C. Fabricate metal roof and fascia panel side laps with a bead of elastomeric sealant that provides a tight seal and prevent metal-to-metal contact, in a manner that will seal weathertight and minimize noise from movements within panel assembly.
- D. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.
1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
 2. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
 3. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
 4. Fabricate cleats and attachment devices of size and metal thickness recommended by SMACNA's "Architectural Sheet Metal Manual" or by metal roof panel manufacturer for application, but not less than thickness of metal being secured.

2.9 GUTTER, FASCIA, AND DOWNSPOUT FABRICATION

- A. General: Fabricate fascia, gutters and downspouts to profiles indicated on drawings. Shop-fabricate work to greatest extent possible. Comply with details shown and with requirements of SMACNA "Architectural Sheet Metal Manual".
- B. Material: Aluminum sheet with "Kynar 500" fluoropolymer coating in color to match roof and fascia panels in thicknesses as follows:
 - 1. Miscellaneous Trim: 0.032 Inch.
 - 2. Gutters: .050 inch, with .063 inch uncoated hangers.
 - 3. Downspouts: .040 Inch.
- C. Hanging Gutter: Join sections with riveted and soldered joints or with lapped joints sealed with sealant. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchored gutter straps spaced not more than 36 inches apart. Provide end closures and seal watertight with sealant.
 - 1. Fabricate gutters for watertight performance.
 - 2. Fasten gutter hangers to front and back of gutter.
 - 3. Loosely lock straps to front gutter bead and anchor to roof deck.
 - 4. Install gutter with expansion joints not exceeding 50 feet apart. Install expansion-joint caps.
- D. Downspouts: Downspouts shall be continuous without joints.
 - 1. Provide hangers of same material as downspouts with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at maximum of 48 inches o.c. in between.

2.10 METAL FINISHES

- A. Fluoropolymer Coating: Manufacturer's standard two-coat, thermo-cured, full-strength 70 percent "Kynar 500" coating consisting of a primer and a minimum 0.75-mil dry film thickness top coat with a total minimum dry film thickness of 0.9-mil and minimum 30 percent reflective gloss when tested in accordance with ASTM D523.
 - 1. Durability: Provide coating that has been field tested under normal range of weathering conditions for minimum of 20 years without significant peel, blister, flake, chip, crack, or check in finish; without chalking in excess of a chalk rating of 8 in accordance with ASTM D4214; and without fading in excess of 5 Hunter units.
 - 2. Color: As selected by the architect from the manufacturer's full range of colors to match metal roof and fascia panels.
 - 3. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5-mil.

2.11 MISCELLANEOUS MATERIALS

- A. Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets, self-locking bolts, end-welded studs and other suitable fasteners designed to withstand design loads.
- B. Accessories: Provide components required for a complete fascia and soffit panel system, including trim, copings, sills, corner units, flashings, sealants, gaskets, fillers, and similar items. Match materials and finishes of panels.
 - 1. Sealing Tape: Pressure sensitive 100 percent solids polyisobutylene compound sealing tape with release paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.
 - 2. Join Sealant: One-part elastomeric polyurethane, polysulfide, or silicone rubber sealant as recommended by the panel manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal roof panel supports, and other conditions affecting performance of the Work.
- B. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal roof panel manufacturer.
- C. Examine roughing-in for components and systems penetrating metal roof panels to verify actual locations of penetrations relative to seam locations of metal roof panels before metal roof panel installation.
- D. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 UNDERLAYMENT INSTALLATION

- A. Self-Adhering Sheet Underlayment: Comply with temperature restrictions of underlayment manufacturer for installation. Apply at locations indicated below, wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps with roller. Cover underlayment within 14 days.
 - 1. Entirety of roof area.

3.3 METAL ROOF PANEL INSTALLATION, GENERAL

- A. Provide metal roof panels of full length from eave to ridge unless otherwise indicated or restricted by shipping limitations.
- B. Thermal Movement. Rigidly fasten metal roof panels to structure at one and only one location for each panel. Allow remainder of panel to move freely for thermal expansion and contraction. Pre-drill panels for fasteners.
 - 1. Point of Fixity: Fasten each panel along a single line of fixing located at ridge.
 - 2. Avoid attaching accessories through roof panels in a manner that will inhibit thermal movement.
- C. Install metal roof panels as follows:
 - 1. Commence panel installation and complete at least 10% but no more than 20% of the installation for initial inspection by a facility-authorized representative of the panel manufacturer.
 - 2. Field cutting of metal panels by torch is not permitted.
 - 3. Locate and space fastenings in uniform vertical and horizontal alignment.
 - 4. Provide metal closures at rake edges rake walls and each side of ridge and hip caps.
 - 5. Flash and seal metal roof panels with weather closures at eaves, rakes, and perimeter of all openings.
 - 6. Install ridge and hip caps as metal roof panel work proceeds.
 - 7. End Splices: Not allowed.
 - 8. Install metal flashing to allow moisture to run over and off metal roof panels.
- D. Fasteners:
 - 1. Aluminum Roof Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior and aluminum or galvanized-steel fasteners for surfaces exposed to the interior.
- E. Anchor Clips: Anchor metal roof panels and other components of the Work securely in place, using manufacturer's approved fasteners according to manufacturers' written instructions.
- F. Metal Protection: Where unpainted dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.
 - 1. Coat back side of roof panels with bituminous coating where roof panels will contact wood, ferrous metal, or cementitious construction.
- G. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal roof panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal roof panel manufacturer.

1. Prepare joints and apply sealants to comply with panel manufacturer's requirements.

3.4 METAL ROOF PANEL INSTALLATION

- A. Standing-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended by manufacturer.
 1. Install clips to roof sheathing with wood screws.
 2. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.

3.5 FASCIA PANEL INSTALLATION

- A. Comply with manufacturer's instructions for assembly and installation. Install in accordance with approved shop drawings.
- B. Anchor Clips: Anchor metal roof panels and other components of the Work securely in place, using manufacturer's approved fasteners according to manufacturers' written instructions.
- C. Standing-Seam Metal Fascia 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 manufacturers and as indicated on engineered shop drawings.
 1. Install clips to supports with self-tapping fasteners.
 2. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.
- D. Isolate dissimilar metals and masonry or concrete from metals with bituminous coating. Use gasketed fasteners where required to prevent corrosive action between fastener, substrate, and panels.
- E. Anchorage shall allow for temperature expansion/contraction movement without stress or elongation of panels or anchors.
- F. Coordinate flashing and sheet metal work to provide weathertight conditions at roof terminations. Fabricate and install in accordance with SMACNA standards, using continuous cleats where indicated on drawings.

3.6 SOFFIT PANEL INSTALLATION

- A. General: Install metal panels according to manufacturer's written instruction in orientation, sizes, and locations indicated. Install panels perpendicular to hat channel

supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Shim or otherwise plumb hat channels receiving metal panels.
2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws.
3. Locate and space fastenings in uniform vertical and horizontal alignment.
4. Install flashing and trim as metal panel work proceeds.
5. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

B. Fasteners:

1. Aluminum Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.

C. Metal Protection: Where dissimilar metal contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.

D. Lap-Seam Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.

1. Apply panels and associated items true to line for neat and weathertight enclosure.
2. All panels shall be side stitched with lap fasteners as specified by panel manufacturer.
3. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.

3.7 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal roof panel assembly including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.

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

1. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges

folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.

2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).
- C. Gutters: Join sections with riveted and soldered or lapped and sealed joints. Attach gutters to eave with gutter hangers spaced not more than 36 inches o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.
 - D. Downspouts: Join sections with telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c. in between.
 1. Provide elbows at base of downspouts to direct water away from building.
 2. Connect downspouts to underground drainage system indicated.
 - E. Roof Curbs: Install curbs at locations indicated on Drawings. Install flashing around bases where they meet metal roof panels.
 - F. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to metal roof panels as recommended by manufacturer.

3.8 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align metal roof panel units within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.9 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect metal roof panel installation, including accessories at least twice during installation. Report results in writing, with photographs of installation progress.
- B. Remove and replace applications of metal roof panels where inspections indicate that they do not comply with specified requirements.
- C. Additional inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.10 CLEANING

- A. Remove temporary protective coverings and strippable films, if any, as metal roof panels are installed unless otherwise indicated in manufacturer's written installation
- B. Instructions. On completion of metal roof panel installation, clean finished surfaces as recommended by metal roof panel manufacturer. Maintain in a clean condition during construction.
- C. Replace metal roof panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 074113

SECTION 075216 - SBS-MODIFIED BITUMINOUS SHEET ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following for application to the cricket portion of the roof:
 - 1. Two-ply modified bituminous membrane roofing with mineral granule surfacing, applied over a base sheet.
 - 2. Modified bituminous sheet flashing.
- B. Related Sections: The following sections contain requirements that relate to this Section:
 - 1. Division 7 Section "Flashing and Sheet Metal" for metal counter flashings.
 - 2. Division 7 Section "Metal Roof Panels" for standing seam metal roof panels and peel-and-stick underlayment.

1.3 DEFINITIONS

- A. Roofing Terminology: Refer to ASTM D 1079 for definitions of terms related to roofing work not otherwise defined in this Section.

1.4 PERFORMANCE REQUIREMENTS

- A. General: Install a watertight, modified bituminous membrane roofing and base flashing system with compatible components that will not permit the passage of liquid water and will withstand wind loads, thermally induced movement, and exposure to weather without failure.
- B. UL Listing: Provide modified bituminous sheet roofing system and component materials that have been tested for application and slopes indicated and are listed by Underwriters Laboratories, Inc. (UL) for Class A external fire exposure.
- C. Florida Product Approval Number: Provide modified bituminous membrane roofing system and component materials that carry a Florida Product Approval Number and/or Miami-Dade Notice-of-Approval (NOA) indicating that the system can resist the following wind uplift pressure:
 - 1. -54psf.

1.5 SUBMITTALS

- A. Product data for each type of product specified. Include data substantiating that materials comply with requirements.
- B. Shop Drawings: Include plans, sections, details, and attachments to other work, for the following:
 - 1. Base flashings, and membrane terminations.
 - 2. Base sheet fastening patterns.
- C. Samples of the following:
 - 1. 12-by-12-inch-square samples of each color modified, bituminous, mineral-surface cap sheets to be exposed as finished roof surface.
 - 2. 12 x 12 inch square samples of modified, bituminous flashing sheets.
 - 3. 2 base sheet fasteners of each type, length, and finish.
- D. Installer Certification: Submit written certification from manufacturer of modified bituminous sheet roofing system certifying that Installer is approved by manufacturer to install specified roofing system. Provide copy of certification to Architect before award of roofing work.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Obtain primary products, including each type of roofing sheet, bitumen, and membrane flashings, from a single manufacturer. Provide secondary products as recommended by manufacturer of primary products for use with roofing system specified.
- B. Installer Qualifications: Engage an experienced Installer (Roofer) who is certified by modified bituminous sheet roofing system manufacturer as qualified to install manufacturer's roofing materials.
 - 1. Installer's Field Supervision: Require Installer to maintain a full-time supervisor/foreman on job site during times that modified bituminous sheet roofing work is in progress and who is experienced in installation of roofing systems similar to type and scope required for this Project.
- C. Preapplication Conference: Before installing roofing system, conduct conference at Project site. Notify participants at least 5 working days before conference.
 - 1. Meet with Owner; Architect; Owner's insurer, if applicable; testing and inspecting agency representative; roofing Installer; roofing system manufacturer's representative; deck Installer; lightning protection system installer; and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
 - 2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
 - 3. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and attachment to structural members.

4. Review loading limitations of deck during and after roofing.
 5. Review flashings, special roofing details, roof drainage, roof penetrations, and condition of other construction that will affect roofing.
 6. Review governing regulations and requirements for insurance, certifications, and inspection and testing, if applicable.
 7. Review temporary protection requirements for roofing system during and after installation.
 8. Review roof observation and repair procedures after roofing installation.
 9. Document proceedings, including corrective measures or actions required, and furnish copy of record to each participant.
- D. Submit certification by the manufacturer of the system materials used that these Specifications and the Drawing Details are acceptable to them for the deck and surfacing to which they are to be applied.
1. If details for any manufacturer's systems proposed in the Contract Documents are not acceptable to the manufacturer, submit corresponding details proposed for the particular application, together with the manufacturer's reasons for not accepting the conditions depicted in the Specifications or Drawings. No alternate details will be considered without evidence of valid objections on the part of the manufacturer to the contract requirements.
- E. Inspection: Prior to, during installation and at completion of the installation, an inspection shall be made by a representative of the manufacturer in order to ascertain that the roofing system has been installed according to their published specifications, standards and details.
1. Warranty will be issued upon approval of the installation.
 2. Manufacturer's inspection reports shall be forwarded to the Architect concurrently with Applications for Payment for the periods during which they occurred.
- 1.7 DELIVERY, STORAGE, AND HANDLING
- A. Store and handle roofing sheets in a dry, well-ventilated, weathertight place to ensure no possibility of significant moisture pickup. Store rolls of felt and other sheet materials on end on pallets or other raised surface.
 - B. Do not leave unused felts and other sheet materials on the roof overnight or when roofing work is not in progress unless protected from weather or other moisture sources.
 - C. Handle and store materials or equipment in a manner to avoid significant or permanent deflection of deck.
- 1.8 PROJECT CONDITIONS
- A. Weather Condition Limitations: Proceed with roofing work only when existing and forecasted weather conditions will permit unit of Work to be installed in accordance with manufacturers' recommendations and warranty requirements.

1.9 ROOFING MEMBRANE WARRANTY AND MEMBRANE FLASHING ENDORSEMENT

- A. Furnish written warranties with membrane flashing endorsements which shall extend from the Date of Substantial Completion as certified by the Architect for a period set forth below, and which shall cover any and all necessary labor and material for repair or replacement work required to keep and maintain the roofing membrane and membrane flashing work in a watertight and first class condition, at no additional cost to the Owner. Warranties and endorsements shall not be pro-rated by design or inflation. These warranties and endorsements shall be limited to cover ordinary wear and tear caused by the elements and to defects due to faulty materials or workmanship.

These warranties shall be furnished independently by each of the following:

1. For a period of two (2) years after the Date of Substantial Completion of the project, by:
 - a. The roofing installer.
 2. For a period of twenty (20) years after the Date of Substantial Completion of the project (20 year no-dollar-limit warranty), by:
 - a. The manufacturer of the roofing products.
 3. For a period of one (1) year after the Date of Substantial Completion of the Project, by:
 - a. The Contractor.
- B. Damages to the building or to its contents during construction and prior to the date of completion of the roofing work shall be borne by the responsible individuals (or firms), excepting the manufacturer, if caused by defects in workmanship. This includes the Contractor and the Roofing Installer.
- C. Damages to the building or to its contents due to defect in workmanship after the Date of Substantial Completion and for a period of two (2) years thereafter shall be severally borne by the responsible firm(s) (Contractor, Roofing Installer), excepting the manufacturer.
- D. The above described warranties and endorsements shall be delivered to the Owner (via the Architect) by the Contractor prior to any obligation of the Owner to reduce the retainage on payments due the Contractor.
- E. No lesser terms of the "standard" warranties or guarantees by the manufacturer shall apply to this Contract if less stringent than the requirements of this Section. The requirements set forth herein shall be set forth in writing in the signed warranties provided to the Owner under this Contract.

1. Warranty shall cover damage to the modified bitumen roofing system caused by

hurricane force winds up to the 155mph design wind velocity noted on the drawings, and resulting uplift pressure up to (-)54psf.

PART 2 - PRODUCTS

2.1 MODIFIED BITUMINOUS SHEET ROOFING SYSTEM

A. Modified Bitumen membrane/Fully Adhered:

1. General:

- a. Performance: provide roofing materials recognized to be of generic type and manufacturer indicated and tested to show compliance with indicated performances.

2. Membrane Manufacturer:

- a. General: Only the modified bitumen roofing manufacturers listed herein may provide the products specified.

- b. For all applications, provide a 2-ply SBS modified bitumen elastomeric roofing system for cold adhesive installation over a mechanically fastened base sheet. The materials of the membrane roofing shall conform to the following requirements:

1. Base Sheet: Smooth, fiberglass scrim reinforced polyester mat composite impregnated with SBS modified bitumen. Minimum thickness 91 mils; minimum weight per square 60 lbs.
2. First Ply-smooth SBS fiberglass or polyester reinforced, 90 mils (average) thick membrane, weight 60 lbs. per 100 sq. ft. (average).
3. Cap Ply - SBS fiberglass reinforced, 114 mils minimum (average) thickness with white granular, "cool roof" surface. Weight 96 lbs. per 100 sq. ft. minimum (average).
4. Flashings - SBS fiberglass or polyester reinforced, 98 mils (minimum) cap thickness, faced with embossed aluminum foil, weight 90 lbs. per 100 sq. ft. (minimum) cap weight, or mineral faced as standard with membrane manufacturer.

- c. Modified Bitumen Roofing Manufacturers: Subject to conformance to specifications including warranty requirements, provide one of the following systems:

1. Siplast Paradiene 20/30 FR, consisting of a Paradiene 20 base sheet mechanically fastened to deck substrate, an inter ply of Paradiene 20 Base; and a cap ply of Paradiene 30 FR Cap, with Veral aluminum-surfaced flashing system applied over Paradiene 20 flashing base ply.

2. Equivalent SBS membrane products having sheet weights equal to or greater than Siplast sheets named above may be provided by GAF, Soprema, or Certain Teed.
 - d. The Contractor shall immediately, upon application of roofing membrane cap plies, install loose white granules into exposed adhesive. Professional workmanship shall be required to keep the roof's white cap sheet and flashing looking aesthetically pleasing upon completion of Project. Voids, air pockets, ridges, and wrinkles are not acceptable as a finished product.
3. Related Materials:
 - a. Pipes or vents shall be jacketed. Jackets shall be formed from minimum 4 lb. Lead sheet with minimum 4 in. flanges and extend into the vent a minimum of 1-1/2 in.

2.3 MISCELLANEOUS MATERIALS

- A. Mastic Sealant: Polyisobutylene (plain or bituminous modified), nonhardening, nonmigrating, nonskinning, and nondrying.
- B. Asphalt Primer: ASTM D41.
- C. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roofing membrane components to plywood substrate; tested by manufacturer for required pullout strength, and acceptable to roofing system manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. With installer present, examine substrate surfaces to receive modified bitumen sheet roofing system and associated work and conditions under which roofing will be installed. Do not proceed with roofing until unsatisfactory conditions have been corrected in a manner acceptable to Installer.
 1. Verify that wood blocking and nailers are securely anchored to roof deck at roof penetrations and terminations.

3.2 GENERAL INSTALLATION REQUIREMENTS

- A. Install modified bituminous membrane roofing system according to roofing system manufacturer's written instructions and applicable recommendations of NRCA/ARMA's "Quality Control Recommendations for Polymer Modified Bitumen Roofing."

- B. Start installation of modified bituminous membrane roofing in presence of roofing system manufacturer's technical personnel.
- C. Cooperate with inspection and test agencies engaged or required to perform services in connection with installing modified bitumen sheet roofing system.
- D. Protect other work from spillage of modified bitumen roofing materials, and prevent liquid materials from entering or clogging drains and conductors. Replace or restore other work damaged by installation of modified bituminous sheet roofing system work.
- E. Coordinate installing roofing system components so that insulation and roofing plies are not exposed to precipitation or left exposed overnight. Provide cut offs at end of each day's work to cover exposed ply sheets and insulation with a course of coated felt with joints and edges sealed with roofing cement. Remove cut offs immediately before resuming work.
- F. Substrate Joint Penetrations: Prevent bitumen from penetrating substrate joints, entering building, or damaging roofing system components or adjacent building construction.
- G. Cutoffs: At end of each day's roofing installation, protect exposed edge of incomplete work, including ply sheets. Provide temporary covering of two plies of No. 15 roofing felt set in full moppings of hot bitumen; remove at beginning of next day's work.

3.3 BASE-SHEET INSTALLATION

- A. Install lapped base-sheet course, extending sheet over and terminating as shown on drawings. Attach base sheet as follows:
 - 1. Mechanically fasten using screws and plates to substrate. Space fasteners as required by specified wind uplift pressure.

3.4 BASE-PLY (INTER PLY) SHEET INSTALLATION

- A. Install modified bitumen base-ply sheets according to roofing system manufacturer's written instructions starting at low point of roofing system. Align base-ply sheets without stretching. Extend sheets over deck and terminate as shown on drawings.
 - 1. Embed each base-ply sheet in a continuous, void-free application of cold adhesive to form a uniform membrane.

3.5 SBS-MODIFIED BITUMINOUS CAP SHEET INSTALLATION

- A. Install modified bituminous roofing membrane cap sheet according to roofing manufacturer's written instructions, starting at low point of roofing system.
 - 1. Embed each cap sheet in a continuous void-free application of cold adhesive to form a uniform membrane.

- B. Laps: Accurately align roofing membrane sheets, without stretching, and maintain uniform side and end laps. Stagger end laps. Completely bond and seal laps, leaving no voids.
 - 1. Repair tears and voids in laps and lapped seams not completely sealed.
 - 2. Apply roofing membrane granules to cover exuded bead at laps while bed is hot.
- C. Install roofing membrane sheets so side and end laps shed water.

3.6 FLASHING AND STRIPPING INSTALLATION

- A. Install flashing at roof edges, and at penetrations through roof; secure to substrates according to roofing system manufacturer's written instructions, and as follows:
 - 1. Prime substrates with asphalt primer if required by roofing system manufacturer.
 - 2. Backer Sheet Application: Adhere backer sheet to substrate in cold-applied adhesive at rate required by roofing system manufacturer.
 - 3. Flashing Sheet Application: Adhere flashing sheet to substrate in cold-applied adhesive ("SFT Flashing Adhesive") at rate required by roofing system manufacturer.
- B. Counter-Flashings: Counter flashings to be coordinated with modified bitumen roofing work are specified in other Sections.

3.7 PROTECTING ROOFING

- A. Protect roofing during remainder of construction period. At end of construction period, or at a time when remaining construction will in no way affect or endanger roofing, inspect roofing and prepare a written report, with copies to Architect and Owner, describing nature and extent of deterioration or damage found.
- B. Repair or replace (as required) deteriorated or defective work found at time of above inspection to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

END OF SECTION 075216

SECTION 076200 – SHEET METAL FLASHING AND TRIM

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Extent of flashings is indicated on the drawings.
- B. Type of work specified in this Section includes the following:
 - 1. Metal flashing for roof installation:
 - a. Base and counterflashings at intersections of roof and masonry walls.
 - b. Flashing of roof-mounted mechanical equipment curbs.
- C. Integral masonry flashings are specified in Section 042000 "Unit Masonry".
- D. Metal roof panels, fascia, soffits, gutters, and downspouts are specified in Section 074113 "Metal Roof Panels".

1.3 JOB CONDITIONS

- A. Do not proceed with the installation of flashing and sheet metal work until curb and substrate construction, cant strips, blocking and other construction to receive work is completed.
- B. The Installer must examine the substrate and the conditions under which flashing and sheet metal work is to be performed, and notify the Contractor, in writing, of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the installer.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Stainless-Steel Sheet: ASTM A 240, Type 302/304.
 - 1. Finish: No. 2D (dull, cold-rolled)
 - 2. Thickness: .0250 Inch (24 gauge).

- B. Fasteners: Series 300 stainless steel.
- C. Metal Accessories: Provide sheet metal clips, straps, lead wedges, anchoring devices and similar accessory units as required for installation of work, matching or compatible with material being installed, noncorrosive, size and gage required for performance.
- D. Bituminous Coating: FS TT-C-494, or Mil-C-18480, or SSPC-Paint 12, cold-applied bituminous mastic, compounded for 15-mil dry-film-thickness coating.

2.2 FABRICATED PRODUCTS

A. Fabricated Metal Flashing, General:

1. Fabricate metal flashing to comply with profiles and sizes shown, and to comply with standard industry details as shown by SMACNA in the "Architectural Sheet Metal Manual". Except as otherwise indicated, provide flat-lock seams, and fold back metal to form a hem on the concealed side of exposed edges.

PART 3 – EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

- A. Comply with manufacturer's instructions and recommendations for handling and installation of flashing.
- B. Performance: Coordinate the work with other work for the correct sequencing of items which make up the entire system of weatherproofing or waterproofing and rain drainage. It is required that the flashing be permanently watertight, and not deteriorate in excess of manufacturer's published limitations.

3.2 INSTALLATION OF METAL WORK

- A. Provide for thermal expansion of all exposed flashings as follows:
 1. 10'-0" maximum spacing and located 2'-0" from corners and intersections.
- B. Conceal fasteners and expansion provisions wherever possible. Fold back edges on concealed side of exposed edges, to form a hem.
- C. Isolate dissimilar metals such as stainless steel and aluminum by application of bituminous coating to prevent metal to metal contact.

3.3 FLASHINGS AT ROOF-TO-WALL INTERSECTIONS

- A. Base Flashings: Secure continuous base flashing to roof deck using stainless steel nails at 4 inches o.c., max., staggered.

- B. Counterflashings: Coordinate installation of counterflashings with installation of assemblies to be protected by counterflashing. Install counterflashings in cut-out 1-1/2 inch deep raggles in brick joints. Secure by means of lead wedges and elastomeric sealant. Lap counterflashing joints a minimum of 6 inches; hem exposed edges on the concealed side.
- C. Equipment Curb Flashing: Coordinate equipment curb flashing installation with roofing and equipment installation. Weld or seal flashing to equipment support member.
- D. Roof-Penetration Flashing: Coordinate roof-penetration flashing installation with roofing and installation of items penetrating roof. Install flashing as follows:
 - 1. Turn lead flashing down inside vent piping, being careful not to block vent piping with flashing.
 - 2. Seal and clamp flashing to pipes penetrating roof, other than lead flashing on vent piping.

END OF SECTION 076200

SECTION 078413 – PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes firestopping and smoke sealing for the following:
 - 1. At the head of fire-resistance-rated and smoke-resistant walls abutting the underside of structural floor and roof decks, and the perimeter of such walls at abutting construction.
 - 2. Penetrations through fire-resistance-rated walls and partitions including both empty openings and openings containing cables, pipes, ducts, conduits, and other penetrating items.
 - 3. Penetrations through smoke barriers and construction enclosing compartmentalized areas involving both empty openings and openings containing penetrating items.
 - 4. Sealant joints in fire-resistance-rated construction.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 15 Sections "Mechanical."
 - 2. Division 16 Sections "Electrical."

1.3 SYSTEM PERFORMANCE REQUIREMENTS

- A. General: Provide firestopping systems that are produced and installed to resist the spread of fire, according to requirements indicated, and the passage of smoke and other gases.
 - 1. Firestopping and smoke sealing shall comply with the requirements of the Florida Building Code, 2010 edition, and NFPA 101, latest edition.
- B. F-Rated Through-Penetration Firestop Systems: Provide through-penetration firestop systems with F ratings indicated, as determined per ASTM E 814, but not less than that equaling or exceeding the fire-resistance rating of the constructions penetrated.
- C. Fire-Resistive Joint Sealants: Provide joint sealants with fire-resistance ratings indicated, as determined per ASTM E 119, but not less than that equaling or exceeding the fire-resistance rating of the construction in which the joint occurs.
- D. For firestopping exposed to moisture and physical damage, provide products that do not deteriorate when exposed to these conditions.

1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
2. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.

1.4 SUBMITTALS

- A. General: Submit the following according to Conditions of Contract and Division 1 Specification Sections.
- B. Product data for each type of product specified.
 1. Certification by firestopping manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs) and are nontoxic to building occupants.
- C. Shop drawings detailing condition-specific materials, installation methods, and relationships to adjoining construction for each through-penetration firestop and smoke seal system, and each kind of construction condition penetrated and kind of penetrating item. Include firestop design designation of qualified testing and inspecting agency evidencing compliance with requirements for each condition indicated.
 1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop and smoke seal configuration for construction and penetrating items.
 2. Where Project conditions require modification of qualified testing and inspecting agency's illustration to suit a particular through-penetration firestop condition, submit illustration approved by firestopping manufacturer's fire protection engineer with modifications marked.
- D. Product certificates signed by manufacturers of firestopping products certifying that their products comply with specified requirements.
- E. Product test reports from, and based on tests performed by, a qualified testing and inspecting agency evidencing compliance of firestopping with requirements based on comprehensive testing of current products.
- F. Qualification data for firms and persons specified in "Quality Assurance" article to demonstrate their capabilities and experience. Include list of completed projects with project names, addresses, names of Architects and Owners, and other information specified.

1.5 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: Provide firestopping that complies with the following requirements and those specified under the "System Performance Requirements" article:
 1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL, Warnock Hersey, or another agency

- performing testing and follow-up inspection services for firestop systems that is acceptable to authorities having jurisdiction.
2. Through-penetration firestop systems are identical to those tested per ASTM E 814 under conditions where positive furnace pressure differential of at least 0.01 inch of water is maintained at a distance of 0.78 inch below the fill materials surrounding the penetrating items in the test assembly. Provide rated systems complying with the following requirements:
 - a. Through-penetration firestop system products bear classification marking of qualified testing and inspecting agency.
 - b. Through-penetration firestop systems correspond to those indicated by reference to through-penetration firestop system designations listed by UL in their "Fire Resistance Directory," by Warnock Hersey, or by another qualified testing and inspecting agency.
 3. Fire-resistive joint sealant systems are identical to those tested for fire-response characteristics per ASTM E 119 under conditions where the positive furnace pressure differential is at least 0.01 inch of water, as measured 0.78 inch from the face exposed to furnace fire. Provide systems complying with the following requirements:
 - a. Fire-Resistance Ratings of Joint Sealants: As indicated by reference to design designations listed by UL in their "Fire Resistance Directory" or by another qualified testing and inspecting agency.
 - b. Joint sealants, including backing materials, bear classification marking of qualified testing and inspection agency.
- B. Installer Qualifications: Engage an experienced Installer who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having the necessary experience, staff, and training to install manufacturer's products per specified requirements. A manufacturer's willingness to sell its firestopping products to the Contractor or to an Installer engaged by the Contractor does not in itself confer qualification on the buyer.
 - C. Single-Source Responsibility: Obtain through-penetration firestop systems for each kind of penetration and construction condition indicated from a single manufacturer.
 - D. Provide firestopping products: shall not contain asbestos. Products shall be certified by manufacturer as "asbestos free."

1.6 COORDINATION

- A. Coordinate with plumbing, mechanical, electrical, and other trades to ensure that pipe, conduit, cable, and other items which penetrate fire-rated or smoke barrier construction have been permanently installed, and sleeved when necessary, prior to installation of firestops and smoke seals.
- B. Schedule and sequence the work to assure that partitions and other construction which would conceal or enclose penetrations are not erected prior to the installation of firestops and smoke seals.

1.7 WARRANTY AND CERTIFICATION

- A. Contractor shall provide the following notarized affidavit jointly signed by corporate officers, with titles noted, of both the Contractor and material applicator:

“We the undersigned certify that firestops and smoke seals have been installed in accordance with Contract Document requirements and manufacturer’s instructions, and that materials used meet firestopping and smoke sealing requirements of the Contract Documents”.

- B. Manufacturer shall provide the following certification, executed by the appropriate person, with title and department noted:

“Products provided by (manufacturer) for the (name of project) are composed of the same ingredients and formulation or are of the same components and identical construction as products that have been tested by (the testing agency) for various fire resistive and other performance ratings, and when properly applied or installed in accordance with (manufacturer) instructions will perform in a manner consistent with results obtained in the tests conducted by (the testing agency)”.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver firestopping products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer; date of manufacture; lot number; shelf life, if applicable; qualified testing and inspecting agency's classification marking applicable to Project; curing time; and mixing instructions for multicomponent materials.
- B. Store and handle firestopping materials to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

PART 2 - PRODUCTS

2.1 FIRESTOPPING, GENERAL

- A. Compatibility: Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by firestopping manufacturer based on testing and field experience.
- B. Accessories: Provide components for each firestopping system that are needed to install fill materials and to comply with "System Performance Requirements" article in Part 1. Use only components specified by the firestopping manufacturer and approved by the qualified testing and inspecting agency for the designated fire-resistance-rated systems. Accessories include but are not limited to the following items:
 - 1. Permanent forming/damming/backing materials including the following:

- a. Semirefractory fiber (mineral wool) insulation.
 - b. Ceramic fiber.
 - c. Sealants used in combination with other forming/damming materials to prevent leakage of fill materials in liquid state.
 - d. Fire-rated formboard.
 - e. Joint fillers for joint sealants.
- 2. Temporary forming materials.
 - 3. Substrate primers.
 - 4. Collars.
 - 5. Steel sleeves.
- C. Applications: Provide firestopping systems composed of materials specified in this Section that comply with system performance and other requirements.

2.2 FILL MATERIALS FOR THROUGH-PENETRATION FIRESTOP SYSTEMS

- A. Endothermic, Latex Compound Sealant: Single-component, endothermic, latex formulation.
- B. Intumescent, Latex Sealant: Single-component, intumescent, latex formulation.
- C. Intumescent Putty: Nonhardening, dielectric, water-resistant putty containing no solvents, inorganic fibers, or silicone compounds.
- D. Intumescent Wrap Strips: Single-component, elastomeric sheet with aluminum foil on one side.
- E. Job-Mixed Vinyl Compound: Prepackaged vinyl-based powder product for mixing with water at Project site to produce a paintable compound, passing ASTM E 136, with flame-spread and smoke-developed ratings of zero per ASTM E 84.
- F. Mortar: Prepackaged dry mix composed of a blend of inorganic binders, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogenous mortar.
- G. Pillows/Bags: Re-usable, heat-expanding pillows/bags composed of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents and fire-retardant additives.
- H. Silicone Foam: Two-component, silicone-based liquid elastomer that, when mixed, expands and cures in place to produce a flexible, nonshrinking foam.
- I. Silicone Sealant: Moisture-curing, single-component, silicone-based, neutral-curing elastomeric sealant of grade indicated below:
 - 1. Grade: Nonsag formulation for openings in vertical and other surfaces requiring a nonslumping/ gunnable sealant.

- J. Acoustical Sealant (for use only in assemblies indicated to be smoke resistant; not for firesafing of assemblies with fire resistance ratings): ASTM C919 and ASTM C834, water-based, highly elastic caulking; non-bleeding and staining, permanently flexible. Flame spread 0, smoke developed 0.
- K. Products: Subject to compliance with requirements, provide one of the following:
1. Endothermic, Latex Sealant:
 - a. Fyre-Shield, Tremco Inc.
 2. Endothermic, Latex Compounds:
 - a. Flame-Safe FS500/600 Series, W.R. Grace.
 - b. Flame-Safe FS900/FST900 Series, W.R. Grace.
 3. Intumescent Latex Sealant:
 - a. Metacaulk 1000, The RectorSeal Corporation.
 - b. Fire Barrier CP 25WB Caulk, 3M Fire Protection Products.
 - c. Bio Fireshield 500+, The RectorSeal Corporation.
 - d. Bio Fireshield Bio-BF150, The RectorSeal Corporation.
 4. Intumescent Putty:
 - a. SSP Putty, Specified Technologies, Inc.
 - b. SpecSeal Series SSP, Specified Technologies, Inc.
 - c. Fire Barrier Moldable Putty, 3M Fire Protection Products.
 - d. Bio Fireshield Fire Rated Putty, The RectorSeal Corporation.
 5. Intumescent Wrap Strips:
 - a. Fire Barrier FS-195 Wrap/Strip, 3M Fire Protection Products.
 - b. Bio Fireshield Wrap Strip, The RectorSeal Corporation.
 6. Job-Mixed Vinyl Compound:
 - a. USG Firecode Compound, United States Gypsum Co.
 7. Mortar:
 - a. Bio Fireshield K-2 Firestop Mortar, The RectorSeal Corporation
 - b. Bio Fireshield K-10 Firestop Mortar, The RectorSeal Corporation
 8. Pillows/Bags:
 - a. Bio Fireshield Firestop Pillows, The RectorSeal Corporation
 9. Silicone Foams:
 - a. Pensil PEN200 Foam, Specified Technologies, Inc.

10. Silicone Sealants:
 - a. Pensil Silicone Sealant, Specified Technologies, Inc.
 - b. Metacaulk 835+, The RectorSeal Corporation.
 - c. Fyre-Sil, Tremco Inc.
 - d. Fyre-Sil S/L, Tremco Inc.
 - e. Bio Fireshield Biotherm 100 & 200, The RectorSeal Corporation

11. Acoustical Sealant
 - a. Sheetrock Acoustical Sealant, U.S. Gypsum Company.
 - b. AC-20 FTR Acoustical and Insulation Sealant; Pecora Corp.
 - c. Smoke 'N Sound Acoustical Sealant, Specified Technologies, Inc.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of firestopping. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning: Clean out openings and joints immediately prior to installing firestopping to comply with recommendations of firestopping manufacturer and the following requirements:
 1. Remove all foreign materials from surfaces of opening and joint substrates and from penetrating items that could interfere with adhesion of firestopping.
 2. Clean opening and joint substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with firestopping. Remove loose particles remaining from cleaning operation.
 3. Remove laitance and form release agents from concrete.

- B. Priming: Prime substrates where recommended by firestopping manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

- C. Masking Tape: Use masking tape to prevent firestopping from contacting adjoining surfaces that will remain exposed upon completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestopping materials. Remove tape as soon as it is possible to do so without disturbing firestopping's seal with substrates.

3.3 INSTALLING FIRESTOPS AND SMOKESEALS

- A. General: Comply with the "System Performance Requirements" article in Part 1 and the firestop manufacturer's installation instructions and drawings pertaining to products and applications indicated.
- B. Install forming/damming materials and other accessories of types required to support fill materials during their application and in the position needed to produce the cross-sectional shapes and depths required to achieve fire ratings of designated through-penetration and head-of-wall firestop systems. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.
 - 1. In non-fire-rated, smoke-resistant assemblies, install resilient sealant, either acoustical or fire-resistant type, to completely fill all voids at through-penetrations and head-of-wall intersections to block the passage of smoke. In no event shall drywall compound be used for this purpose.
- C. Install fill materials for through-penetration and head-of-wall firestop systems by proven techniques to produce the following results:
 - 1. Completely fill voids and cavities formed by openings, forming materials, accessories, and penetrating items.
 - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
 - 3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 INSTALLING FIRE-RESISTIVE JOINT SEALANTS

- A. General: Comply with the "System Performance Requirements" article in Part 1, with ASTM C 1193, and with the sealant manufacturer's installation instructions and drawings pertaining to products and applications indicated.
- B. Install joint fillers to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability and develop fire-resistance rating required.
- C. Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint width that optimum sealant movement capability. Install sealants at the same time joint fillers are installed.
- D. Tool nonsag sealants immediately after sealant application and prior to the time skinning or curing begins. Form smooth, uniform beads of configuration indicated or required to produce fire-resistance rating, as well as to eliminate air pockets, and to ensure contact and adhesion of sealants with sides of joint. Remove excess sealant from surfaces

adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

3.5 CLEANING

- A. Clean off excess fill materials and sealants adjacent to openings and joints as work progresses by methods and with cleaning materials approved by manufacturers of firestopping products and of products in which opening and joints occur.
- B. Protect firestopping during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated firestopping immediately and install new materials to produce firestopping complying with specified requirements.

END OF SECTION 078413

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes joint sealants for the following locations:
 - 1. Exterior joints in vertical surfaces and nontraffic horizontal surfaces as indicated below:
 - a. Control and expansion joints in unit masonry.
 - b. Perimeter joints between materials listed above and frames of doors and windows.
 - c. Control and expansion joints in ceiling and overhead surfaces.
 - d. Other joints as indicated.
 - 2. Exterior joints in horizontal traffic surfaces as indicated below:
 - a. Control, expansion, and isolation joints in cast-in-place concrete slabs.
 - b. Other joints as indicated.
 - 3. Interior joints in vertical surfaces and horizontal nontraffic surfaces as indicated below:
 - a. Control and expansion joints on exposed interior surfaces of exterior walls.
 - b. Perimeter joints of exterior openings where indicated.
 - c. Vertical control joints on exposed surfaces of interior unit masonry and concrete walls and partitions.
 - d. Perimeter joints between interior wall surfaces and frames of interior doors and windows.
 - e. Other joints as indicated.
 - 4. Interior joints in horizontal traffic surfaces as indicated below:
 - a. Control and expansion joints in cast-in-place concrete slabs.
 - b. Other joints as indicated.
- B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 7 Section "Flashing and Sheetmetal" for sealants used in sheetmetal work.
2. Division 8 Section "Glass and Glazing" for sealants used in glazing.

1.3 SYSTEM PERFORMANCE REQUIREMENTS

- A. Provide elastomeric joint sealants that have been produced and installed to establish and to maintain watertight and airtight continuous seals without causing staining or deterioration of joint substrates.

1.4 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract.
- B. Product data from manufacturers for each joint sealant product required.
- C. Samples for initial selection purposes in form of manufacturer's standard bead samples, consisting of strips of actual products showing full range of colors available, for each product exposed to view.
- D. Certificates from manufacturers of joint sealants attesting that their products comply with specification requirements and are suitable for the use indicated.
- E. Provide and maintain a file of manufacturer's instructions for each of the products used.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced Installer who has completed joint sealant applications similar in material, design, and extent to that indicated for Project that have resulted in construction with a record of successful in-service performance.
- B. Single Source Responsibility for Joint Sealant Materials: Obtain joint sealant materials from a single manufacturer for each different product required.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle materials in compliance with manufacturer's recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.7 PROJECT CONDITIONS

- A. Environmental Conditions: Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealant manufacturer.
 - 2. When joint substrates are wet.
- B. Joint Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than allowed by joint sealant manufacturer for application indicated.
- C. Joint Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with their adhesion are removed from joint substrates.

1.8 SEQUENCING AND SCHEDULING

- A. Sequence installation of joint sealants in existing interior concrete pavement to occur prior to application of clear concrete sealing compound where indicated or scheduled on drawings.

PART 2 – PRODUCTS

2.1 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, joint fillers, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
- B. Colors: Provide color of exposed joint sealants to comply with the following:
 - 1. Provide selections made by Architect from manufacturer's full range of standard colors for products of type indicated.

2.2 ELASTOMERIC JOINT SEALANTS

- A. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing elastomeric sealants that comply with ASTM C 920, including those requirements referencing ASTM C 920 classifications for Type, Grade, Class, and Uses.
- B. Products: Subject to compliance with requirements, provide one of the products specified in color selected by Architect from manufacturer's full color range.

- C. Single Part, Nonsag, Polyurethane Sealant for use in sealing hollow metal door frames to adjoining wall surfaces, roof flashing and edge metal installations, and general purpose exterior sealing except where silicone is specified:
1. "Vulkem 921"; Tremco.
 2. "Dynatrol 1"; Pecora Corp.
 3. "Sika Flex-1a"; Sika Corp.
 4. "Sonolastic NP 1"; Sonneborn brand by BASF Building Systems.
- D. Single Part Pourable Polyurethane Sealant for use in horizontal joints in floor slabs, sidewalks, and concrete pavement. Provide one of the following:
1. "Vulkem 45"; Mameco International, Inc.
 2. "NR-201 Urexpan"; Pecora Corp.
 3. "Sonolastic SL1"; BASF Construction Chemicals.
- E. Medium-Modulus Neutral-Curing Silicone Sealant for use in all exterior masonry control and expansion joints, and for perimeter sealing of aluminum windows and storefronts.
1. 791; Dow Corning (accommodates joint movement of ± 50 percent).
 - a. Apply to masonry and concrete with Dow Corning 1200 Primer.
 2. "Sonolastic 150"; BASF Construction Chemicals.

2.3 LATEX JOINT SEALANTS

- A. Acrylic-Emulsion Sealant: Manufacturer's standard, one part, nonsag, mildew-resistant, acrylic-emulsion sealant complying with ASTM C 834, formulated to be paintable and recommended for exposed applications on interior locations involving joint movement of not more than plus or minus 5 percent. Provide at intersections of interior door and window frames and adjoining wall surfaces.
1. "AC-20"; Pecora Corp.
 3. "Sonolac"; Sonneborn Building Products.

2.4 ACOUSTICAL JOINT SEALANT

- A. Acoustical sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 and the following:
1. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
 2. Install at perimeter joints around all electrical boxes in acoustically-rated walls and all drywall ceilings throughout Music Building 1 and Building 1 Addition, and elsewhere as indicated on drawings.

- B. Manufacturer – Provide one of the following:
 - 1. AC-20FTR Acoustical and Insulation Sealant; Pecora Corporation
 - 2. Sheetrock Acoustical Sealant; USG Corp.

2.5 MILDEW – RESISTANT SILICONE SEALANT

- A. One-part mildew-resistant interior sealant designed to seal nonporous interior building surfaces including tubs, sinks, lavatories, and urinals at perimeter intersection with finished walls.
- B. Manufacturer – Provide one of the following:
 - 1. Dow Corning 786 Mildew-Resistant Silicone Sealant.
 - 2. Sanitary SCS1700 Sealant; G.E. Silicones

2.5 JOINT SEALANT BACKING

- A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Plastic Foam Joint Fillers: Preformed, compressible, resilient, nonstaining, nonwaxing, nonextruding strips of flexible plastic foam of either material indicated below and of size, shape, and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
 - 1. Closed-cell polyethylene foam, nonabsorbent to liquid water and gas, nonoutgassing in unruptured state.
 - 2. Proprietary, reticulated, closed-cell polymeric foam, nonoutgassing, with a density of 2.5 pcf (40 kg/cu. m) and tensile strength of 35 psi (240 kPa) per ASTM D 1623, and with water absorption less than 0.02 g/cc per ASTM C 1083.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.6 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances

capable of staining or harming in any way joint substrates and adjacent nonporous surfaces, and formulated to promote optimum adhesion of sealants with joint substrates.

- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint sealant performance. Do not proceed with installation of joint sealants until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with recommendations of joint sealant manufacturer and the following requirements:
 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 2. Clean concrete, masonry, unglazed surfaces of ceramic tile, and similar porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
 3. Remove laitance and form release agents from concrete.
 4. Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile, and other nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
- B. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealant manufacturer based on preconstruction joint sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's recommendations. 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 with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint sealant manufacturer's printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Installation of Sealant Backings: Install sealant backings to comply with the following requirements:
 - 1. Install joint fillers of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - a. Do not leave gaps between ends of joint fillers.
 - b. Do not stretch, twist, puncture, or tear joint fillers.
 - c. Remove absorbent joint fillers that have become wet prior to sealant application and replace with dry material.
 - 2. Install bond breaker tape between sealants where backer rods are not used between sealants and joint fillers or back of joints.
- D. Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability. Install sealants at the same time sealant backings are installed.
- E. Tooling of Nonsag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.
 - 1. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.

3.4 CLEANING

- A. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so that and installations with repaired areas are indistinguishable from original work.

END OF SECTION 079200

SECTION 081113 – HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Hollow-metal doors.
 - 2. Hollow-metal frames.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 4 Section "Unit Masonry" for building anchors into and grouting frames in masonry construction.
 - 2. Division 8 Section "Flush Wood Doors" for solid-core wood doors installed in hollow metal frames.
 - 3. Division 8 Section "Door Hardware" for door hardware and weatherstripping.
 - 4. Division 8 Section "Glazing" for glass in hollow metal doors and sidelights.
 - 5. Division 9 Section "Painting" for field painting primed doors and frames.

1.3 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings.

1.4 SUBMITTALS

- A. Approval Numbers: Provide State of Florida Product Approval Numbers.
- B. Product Data: Include construction details, material descriptions, core descriptions, label compliance, fire-resistance rating, and finishes for each type of steel door and frame specified.
- C. Shop Drawings:
 - 1. In addition to requirements below, provide a schedule of standard steel doors and frames using same reference numbers for details and openings as those on Drawings:
 - a. Elevations of each door design.

- b. Details of doors, including vertical and horizontal edge details.
 - c. Frame details for each frame type, including dimensioned profiles.
 - d. Details and locations of reinforcement and preparations for hardware.
 - e. Details of each different wall opening condition.
 - f. Details of anchorages, accessories, joints, and connections.
2. State of Florida Product Approval must be applicable to actual door and frame sizes indicated on drawings.
 3. Shop drawings shall indicate hardware locations for doors and frames based upon Steelcraft standards. No other locations are acceptable.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
- B. Source Limitations: Obtain standard steel doors and frames through one source from a single manufacturer.
- C. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated.
 1. Test Pressure: Test at atmospheric (neutral) pressure according to NFPA 252 or UL 10B.
- D. Smoke-Control Door Assemblies: Comply with NFPA 105 or UL 1784.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver doors and frames palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store doors and frames under cover at Project site. Place units in a vertical position with heads up, spaced by blocking, on minimum 4-inch- high wood blocking. Avoid using nonvented plastic or canvas shelters that could create a humidity chamber.
 1. If wrappers on doors become wet, remove cartons immediately. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.8 COORDINATION

- A. Coordinate installation of anchorages for standard steel frames. 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.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Ceco Door Products.
 - 2. CURRIES Company; an ASSA ABLOY Group Company.
 - 3. Republic Builders Products Company.
 - 4. Steelcraft; an Ingersoll-Rand Company.
 - 5. Hollow Metal, Inc.
 - 6. Amweld International, LLC

2.2 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. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum A60 (ZF180) zinc-iron-alloy (galvannealed) coating designation.
- D. Supports and Anchors: After fabricating, galvanize units to be built into exterior walls according to ASTM A 153/A 153M, Class B.
- E. Inserts, Bolts, and Fasteners: Provide items to be built into exterior walls, hot-dip galvanized according to ASTM A 153/A 153M.

2.3 HOLLOW METAL DOORS

- A. General: Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces, unless otherwise indicated. Comply with ANSI A250.8.
 - 1. Design: As indicated on Drawings.

2. Core Construction: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core that produces doors complying with ANSI A250.8.
 - a. Fire Door Core: As required to provide fire-protection ratings indicated.
 3. Vertical Edges for Single-Acting Doors: Beveled edge
 - a. Beveled Edge: 1/8 inch in 2 inches.
 4. Top and Bottom Edges: Closed with flush (at top), inverted (at bottom), 0.042-inch-thick end closures or channels of same material as face sheets.
 5. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."
- B. Exterior and Interior Doors: Face sheets fabricated from A-60 galvanized steel sheet. Provide doors complying with requirements indicated below by referencing ANSI A250.8 for level and model and ANSI A250.4 for physical-endurance level:
1. Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 2 (Seamless), 16 gage (.053 inch).
 2. Exterior doors shall be hurricane resistant and tested for compliance with ANSI A250.13.
 3. Exterior doors shall be rated to resist the following minimum pressures which have been adjusted by a .6 load factor applied to the ultimate pressures:
 - a. Single Doors: (+) 35.1 psf; (-) 47.0 psf.
 - b. Door Pairs: (+) 33.4 psf; (-) 43.7 psf.
 4. Exterior doors shall bear the label of the National Fenestration Rating Council (NFRC) and shall comply with Chapters 3 and 4 of the Florida Building Code, Fifth Edition (2014), Energy Conservation.
 - a. Exterior doors shall have a maximum U-Value of U-0.61 per FBC Table C402.2 for Swinging, Opaque Doors.
- C. Hardware Reinforcement: Fabricate reinforcement plates from same material as door face sheets to comply with the following minimum sizes:
1. Hinges: Minimum 0.123 inch thick by 1-1/2 inches wide by 6 inches longer than hinge, secured by not less than 6 spot welds.
 2. Pivots: Minimum 0.167 inch thick by 1-1/2 inches wide by 6 inches longer than hinge, secured by not less than 6 spot welds.
 3. Lock Face, Flush Bolts, Closers, and Concealed Holders: Minimum 0.067 inch thick.
 4. All Other Surface-Mounted Hardware: Minimum 0.067 inch thick.
- D. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.

2.4 STANDARD STEEL FRAMES

- A. General: Comply with ANSI A250.8 and with details indicated for type and profile.
- B. Exterior and Interior Frames: Fabricated from A-60 galvanized steel sheet.
 - 1. Fabricate frames with mitered or coped and continuously welded face corners.
 - 2. Frames for Level 3 Steel Doors: 16 gage (.053 inch) thick steel sheet.
- C. Hardware Reinforcement: Fabricate reinforcement plates from same material as frames to comply with the following minimum sizes:
 - 1. Hinges: Minimum 0.123 inch thick by 1-1/2 inches wide by 6 inches longer than hinge, secured by not less than 6 spot welds.
 - 2. Pivots: Minimum 0.167 inch thick by 1-1/2 inches wide by 6 inches longer than hinge, secured by not less than 6 spot welds.
 - 3. Lock Face, Flush Bolts, Closers, and Concealed Holders: Minimum 0.067 inch thick.
 - 4. All Other Surface-Mounted Hardware: Minimum 0.067 inch thick.
- D. Supports and Anchors: Fabricated from electrolytic zinc-coated or metallic-coated steel sheet.
- E. Jamb Anchors:
 - 1. Masonry Type: Adjustable strap-and-stirrup 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.
 - 2. Postinstalled Expansion Type for In-Place Concrete 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.
- F. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.
- G. Plaster Guards: Formed from same material as frames, not less than 0.016-inch thick.

2.5 FABRICATION

- A. General: Fabricate standard steel doors and frames to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
- B. Hollow Metal Doors:
 - 1. Exterior Doors: Provide weep-hole openings in bottom of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.

- 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. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
 2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners, unless otherwise indicated.
 3. Plaster Guards: Weld guards to frame at back of hardware mortises in frames installed in concrete or masonry.
 4. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. Provide three anchors per jamb.
 - b. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.
 5. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Provide plastic plugs to keep holes clear during construction.
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
- D. Hardware Preparation: Factory prepare standard steel doors and frames to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping.
1. All locations shall be based upon Steelcraft standards.
 2. Reinforce doors and frames to receive nontemplated mortised and surface-mounted door hardware.
 3. Comply with applicable requirements in ANSI A250.6 and ANSI/DHI A115 Series specifications for door and frame preparation for hardware. Locate hardware according to ANSI A250.8.

2.6 STEEL FINISHES

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
1. Finish standard steel door and frames after assembly.
- B. Galvannealed Steel Surface Preparation: Clean surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating suited to the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas, and apply galvanizing repair paint specified below to comply with ASTM A 780.

1. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.
- C. Factory Priming for Field-Painted Finish: Apply shop primer specified below immediately after surface preparation and pretreatment. Apply a smooth coat of even consistency to provide a uniform dry film thickness of not less than 0.7 mils.
1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied finish paint system indicated; and providing a sound foundation for field-applied topcoats despite prolonged exposure.

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 standard steel doors and frames.
1. Examine roughing-in for embedded and built-in anchors to verify actual locations of standard steel frame connections before frame installation.
 2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory.
- B. Prior to installation and with installation spreaders in place, adjust and securely brace standard steel door frames for squareness, alignment, twist, and plumb to the following tolerances:
1. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 2. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 3. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 4. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.
- C. Drill and tap doors and frames to receive nontemplated mortised and surface-mounted door hardware.

3.3 INSTALLATION

- A. General: Provide doors and frames of sizes, thicknesses, and designs indicated. Install standard steel doors and frames plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.
- B. Hollow Metal Frames: Install hollow metal frames for doors of size and profile indicated. Comply with SDI 105.
 - 1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - a. At fire-protection-rated openings, install frames according to NFPA 80.
 - b. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - c. Check plumb, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 - 2. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 - 3. Installation Tolerances: Adjust standard steel door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.
- C. Hollow Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.
 - 1. Non-Fire-Rated Standard Steel Doors:
 - a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
 - b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
 - c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
 - d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.
 - 2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
 - 3. Smoke-Control Doors: Install doors according to NFPA 105.

3.4 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including standard steel doors or frames that are warped, bowed, or otherwise unacceptable.
- B. Clean grout and other bonding material off standard steel doors and frames 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 primer.
- D. Galvannealed Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION 081113

SECTION 081416 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Solid core doors with wood veneer faces.
 - 2. Factory fitting flush wood doors to frames and factory machining for hardware.
- B. Related Sections:
 - 1. Division 9 Section "Painting" for field painting of metal louvers and metal frames for light openings.
 - 2. Division 8 Section "Glazing" for glass in view panels in flush wood doors.

1.3 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract.
- B. Product data for each type of door, including details of core and edge construction, trim for openings and louvers, and factory-finishing specifications.
- C. Shop drawings indicating location and size of each door, elevation of each kind of door, details of construction, location and extent of hardware blocking, fire ratings, and other pertinent data.
 - 1. For factory-machined doors, indicate dimensions and locations of cutouts for locksets and other cutouts adjacent to light and louver openings.
- D. Samples for Initial Selection: Color charts consisting of actual materials in small sections for the following:
 - 1. Faces of Factory-Finished Doors: Show the full range of colors available for stained finishes.
- E. Samples for Verification:
 - 1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches, for each material and finish. For each wood species and transparent finish, provide set of three samples showing typical range of color and grain to be expected in the finished work.

1.4 QUALITY ASSURANCE

- A. Quality Standard: Comply with the following standard:
 - 1. AWI Quality Standard: Architectural Woodwork Quality Standards of the Architectural Woodwork Institute for grade of door, core, construction, finish, and other requirements.
 - 2. WDMA I.S.1-A, "Architectural Wood Flush Doors."
- B. Fire-Rated Wood Doors: Provide wood doors that comply with NFPA 80; are identical in materials and construction to units tested in door and frame assemblies per ASTM E 152; and are labeled and listed by UL, Warnock Hersey, or another testing and inspection agency acceptable to authorities having jurisdiction.
- C. Single-Source Responsibility: Obtain doors from one source and by a single manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect doors during transit, storage, and handling to prevent damage, soiling, and deterioration. Comply with requirements of referenced standard and manufacturer's instructions.
- B. Identify each door with individual opening numbers as designated on shop drawings, using temporary, removable, or concealed markings.

1.6 PROJECT CONDITIONS

- A. Conditioning: Do not deliver or install doors until conditions for temperature and relative humidity have been stabilized and will be maintained in storage and installation areas during the remainder of the construction period to comply with the following requirements applicable to Project's geographical location:
 - 1. AWI quality standard Section 100-S-11 "Relative Humidity and Moisture Content."

1.7 WARRANTY

- A. General Warranty: Door manufacturer's warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- B. Door Manufacturer's Warranty: Submit written agreement on door manufacturer's standard form signed by manufacturer, Installer, and Contractor, agreeing to repair or replace defective doors that have warped (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section or that show telegraphing of core construction in face veneers

exceeding 0.01 inch in a 3-inch span, or do not conform to tolerance limitations of referenced quality standards.

1. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors where defect was not apparent prior to hanging.
2. Warranty shall be in effect during the following period of time after date of Substantial Completion.
 - a. Solid Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirements, provide doors by one of the following:
 1. Solid Core Doors:
 - a. Algoma Hardwoods, Inc.
 - b. Eggers Industries
 - c. Graham Wood Doors
 - d. Marshfield Door Systems
 - e. Mohawk Flush Doors, Inc.
 - f. VT Industries, Inc.

2.2 INTERIOR FLUSH WOOD DOORS

- A. Solid Core Doors for Transparent Finish: Comply with the following requirements:
 1. Faces: Running, book-matched, rotary-cut, white birch.
 2. A.W.I. Grade: Premium.
 3. Construction: PC 5 (Particleboard core, 5 ply, with core bonded to faces).
 4. Core: Particleboard core, ANSI A208.1, Grade LD-2.
 5. Bonding: Stiles and rails bonded to core, then entire unit abrasive planed before veneering.
- B. Fire-Rated Solid Core Doors: Comply with the following requirements:
 1. Faces and Grade: Provide faces and grade to match non-fire-rated doors in same area of building, unless otherwise indicated.
 2. Construction: Manufacturer's standard core construction as required to provide fire-resistance rating indicated.
 3. Blocking: Provide composite blocking designed to maintain fire resistance of door but with improved screw-holding capability of same thickness as core and with minimum dimensions as follows:
 - a. 5-inch top rail blocking.
 - b. 5-inch bottom rail blocking.
 - c. 5-by-18-inch lock blocks.

- d. 5-inch midrail blocking.

2.3 LOUVERS AND LIGHT FRAMES

- A. Metal Louvers: Field install in factory cut opening.
 - 1. Blade Type: Vision-proof, inverted V.
 - 2. Metal and Finish: Galvanized steel, 0.040 inch thick, hot-dip zinc coated and factory primed for paint finish.
 - 3. Fire Door Louvers: Metal louvers with fusible link and closing device, listed and labeled for use in doors with fire rating of one and one-half hours and less.
- B. Metal Frames for Light Openings: Manufacturer's standard frame formed of 0.048-inch thick, cold-rolled steel sheet; factory primed and approved for use in doors including fire rated doors where indicated.

2.4 FABRICATION

- A. Fabricate flush wood doors to comply with following requirements:
 - 1. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels:
 - a. Comply with clearance requirements of referenced quality standard for fitting.
 - b. Comply with requirements of NFPA 80 for fire-resistance-rated doors.
 - 2. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame shop drawings, DHI A115-W series standards, and hardware templates.
 - a. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before proceeding with factory machining.
- B. Openings: Factory cut and trim openings through doors to comply with applicable requirements of referenced standards for kind(s) of door(s) required.
 - 1. Light Openings: Trim openings with moldings of material and profile indicated.
 - 2. Glazing: Factory install glazing in doors. Comply with applicable requirements in Section 088000 "Glazing."
 - 3. Louvers: Field install louvers in factory prepared openings.

2.5 FACTORY FINISHING

- A. General: Comply with AWI's "Architectural Woodwork Quality Standards Illustrated" for factory finishing.
- B. Finish doors at factory.

C. Transparent Finish:

1. Grade: Premium
2. Finish: WDMA System TR-8 UV cured catalyzed polyurethane.
3. Staining: As selected by Architect from manufacturer's full range.
4. Sheen: Satin

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine installed door frames prior to hanging door:
 1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with plumb jambs and level heads.
 2. Reject doors with defects.
- B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Hardware: For installation see Division 8 Section "Door Hardware."
- B. Manufacturer's Instructions: Install wood doors to comply with manufacturer's instructions and referenced quality standard and as indicated.
 1. Install fire-rated doors in corresponding fire-rated frames according to requirements of NFPA 80.
 2. Fitting Clearances for Non-Fire-Rated Doors: Provide 1/8 inch at jambs and heads, 1/16 inch per leaf at meeting stiles for pairs of doors, and 1/8 inch from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide 1/4-inch clearance from bottom of door to top of threshold.
 3. Fitting Clearances for Fire-Rated Doors: Comply with NFPA 80.
- C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

3.3 ADJUSTING AND PROTECTION

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Refinish or replace doors damaged during installation.
- C. Protect doors as recommended by door manufacturer to ensure that wood doors will be without damage or deterioration at the time of Substantial Completion.

END OF SECTION 08211

SECTION 083613 - SECTIONAL OVERHEAD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes sectional overhead doors, as follows:
 - 1. Steel panel doors with polycarbonate plastic windows.
- B. Related Sections include the following:
 - 1. Division 9, Section "Painting" for field-applied paint finish on exterior sides of doors.

1.3 SUBMITTALS

- A. General: Submit the following according to Conditions of the Contract.
- B. Product data, roughing-in diagrams, and installation instructions for each type and size of overhead door. Include manufacturer's operating instructions and maintenance data.
- C. Shop drawings for special components and installations which are not fully dimensioned or detailed in manufacturer's data including wind bracing for door panels.
 - 1. Drawings must include details for anchorage of door tracks to building to meet wind and impact load requirements. Indicate fastener or weld type, size, and spacing for attachment to masonry walls.
 - 2. Shop drawings shall be signed and sealed by a Florida registered professional engineer.
 - 3. Shop Drawings shall include State of Florida Product Approval.
 - a. Approval must be applicable to actual door size specified herein.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Provide each sectional overhead door as a complete unit produced by a single manufacturer, including frames, sections, brackets, guides, tracks, counterbalance mechanisms, hardware, and installation accessories.

- B. Installer: Installation of sectional doors shall be performed by an authorized representative of the manufacturer. Provide written documentation that installer is properly authorized by the door manufacturer.
- C. Single-Source Responsibility: Provide doors, tracks, and accessories from one manufacturer. Provide secondary components from source acceptable to manufacturer of primary components.
- D. Pre-Installation Conference: Schedule and convene a pre-installation conference just prior to commencement of field operations, to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work.
- E. Wind Loads: Provide sectional overhead door system including anchorage to building capable of withstanding wind load design pressures as indicated:
 - 1. Pressures shown are allowable based upon nominal design wind speeds (V_{asd}) to which a load factor of .6 has already been applied:
 - a. Positive pressure = 28.9 p.s.f.
 - b. Negative pressure = -34.5 p.s.f.
- F. Missile Impact Loads: Provide sectional overhead door system including anchorage to building capable of withstanding large and small missile impact loads in accordance with the Florida Building Code, Section 1609.
 - 1. Comply with Missile Level E Enhanced Protection requirements for Essential Facilities in accordance with ASTM E 1996.

1.5 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of sectional doors that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including, but not limited to, excessive deflection.
 - b. Failure of components or operators before reaching required number of operation cycles.
 - c. Faulty operation of hardware.
 - d. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use; rust through.
 - 2. Warranty period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements provide the following or approved equal:
1. DAB Door Company – Hurricane Master Series 824 Sectional Door with window lite option.
 2. Substitutions: Equivalent products by other manufacturers will be considered upon receipt of a properly submitted substitution request not less than 10 days prior to bid opening. Such requests must be accompanied by a copy of a shop drawing reflecting State of Florida Product Approval and compliance with wind load pressures and missile impact resistance as noted above for the specified door size.

2.2 STEEL SECTIONS

- A. Sectional Door Assembly: Steel door assembly with rabbeted meeting rails to form weathertight joints and provide full-width interlocking structural rigidity. Units shall have the following characteristics:
1. Panel Thickness: 2".
 2. Exterior Surface: Embossed, wood grain texture.
 3. Steel: Minimum 24 gauge, galvanized.
 4. Center and End Stiles: 16 gauge.
 5. Finish and Color: Factory-applied baked-on white polyester coating.
 6. Height: 16'-0" (required for actual, 15'-10" masonry opening to top center of masonry arch).
 7. Width: 12'-8" (required for 12'-0" actual, clear brick masonry opening). Door must be wide enough to allow tracks' continuous angles to be secured to reinforced concrete columns, not brick masonry veneer, as indicated on drawings.
- B. Reinforce sections with continuous horizontal reinforcing, as required by door width and design wind loading. Provide galvanized steel angles, bars, struts, channels, or U-bars, formed to depth, and bolted in place.

2.3 WINDOWS

- A. Provide one row of windows in each door as indicated on drawings.
1. Windows shall comply with Florida Building Code Large Missile Level E Impact Test requirements.
 2. Windows shall be ¼" nominal thickness Lexan MR10 polycarbonate secured with PVC frames to steel door panels.

2.4 TRACKS, SUPPORTS, AND ACCESSORIES

- A. Tracks: Provide manufacturer's standard, 3" galvanized-steel track system designed for clearances shown. Provide complete track assembly including brackets, bracing and reinforcing for rigid support of ball-bearing roller guides for required door type and size. Slope tracks at proper angle from vertical, or otherwise design to ensure tight closure at jambs when door unit is closed. Weld or bolt to track supports.
 - 1. Provide standard lift track.
- B. Track Reinforcement and Supports: Provide galvanized-steel track reinforcement and support members. Secure, reinforce and support tracks as required for size and weight of door to provide strength and rigidity without sag, sway, and vibration during opening and closing of doors.
- C. Support and attach tracks to opening jambs with continuous angle welded to tracks and attached to wall. Support horizontal (ceiling tracks) with continuous angle welded to track and supported by laterally braced attachments to overhead structural members at curve, mid-point, and end of tracks.
- D. Weather Seals: Provide continuous rubber, neoprene, or flexible vinyl adjustable weatherstrip gasket at tops and compressible astragal on bottoms of each overhead door. Provide jamb seals.

2.5 HARDWARE

- A. General: Provide heavy-duty, rust-resistant hardware, with galvanized or cadmium-plated or stainless steel fasteners, to suit type of door.
- B. Hinges: Provide heavy steel hinges at each end stile and at each intermediate stile, per manufacturer's recommendations for size of door. Attach hinges to door sections through stiles and rails with bolts and lock nuts or lock washers and nuts. Use rivets or self-tapping fasteners where access to nuts is not possible.
- C. Rollers: Provide heavy-duty rollers, with steel ball bearings in case-hardened steel races, mounted with varying projections to suit slope of track. Extend roller shaft through both hinges where double hinges are required. Provide roller tires to suit size of track (3-inch diameter for 3-inch track) and as follows:
 - 1. Case-hardened steel tires for normal installations.

2.6 COUNTERBALANCING MECHANISM

- A. Torsion Spring: Operation by torsion-spring counterbalance mechanism, consisting of heavy duty adjustable-tension, tempered-steel torsion springs mounted on a cross header tube or steel shaft. Connect to door with galvanized aircraft-type lift cables. Provide springs calibrated for 100,000 cycles minimum.

- B. Provide cast-aluminum or grey-iron casting cable drums, grooved to receive cable. Mount counterbalance mechanism with manufacturer's standard ball-bearing brackets at each end of shaft. Provide one additional midpoint bracket for shafts up to 16 feet long and two additional brackets at one-third points to support shafts over 16 feet long, unless closer spacing recommended by door manufacturer.
- C. Provide a spring bumper at each horizontal track to cushion door at end of opening operation.

2.7 ELECTRIC DOOR OPERATORS

- A. General: Furnish electric door-operator assembly of size and capacity recommended and provided by door manufacturer; complete with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking door, and accessories required for proper operation.
- B. Disconnect Device: Hand-operated disconnect device or mechanism for automatically engaging chain-and-sprocket operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount emergency chain operator so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.
- C. Design operator so that motor may be removed without disturbing limit-switch adjustment and without affecting emergency auxiliary operator.
- D. Provide 6 digit, non-resettable counter mounted to each operator.
- E. Door Operator Type: Provide the following:
 - 1. Jackshaft (side mount) gear-head hoist type, with enclosed worm-gear, running-in-oil, primary drive; chain-and-sprocket secondary drive; auxiliary chain hoist; and floor-level quick release for manual operation.
 - a. Product: Provide Liftmaster Model GH 75 operator.
- F. Electric Motors: Provide high-starting torque, reversible, constant-duty, Class A-insulated electric motors with overload protection, sized to move door in either direction, from any position, at not less than 2/3 foot per second or more than 1 foot per second.
 - 1. Coordinate wiring requirements and current characteristics of motors with building electrical system.
 - 2. Provide open-drip-proof type motor, and controller with NEMA ICS 6, Type 1 enclosure.
 - 3. Motor to be minimum $\frac{3}{4}$ H.P.
- G. Remote Control Station: Provide momentary-contact, three-button control station with push button controls labeled "Open", "Close", and "Stop".

1. Provide interior units, full-guarded, surface-mounted, heavy-duty, with general purpose NEMA Type 1 enclosure, three per door as indicated on drawings (two gangs of six stations each plus one individual switch located at each door).
- H. Radio control system: Provide universal radio control system. Provide one UHF radio receiver for each door operator. Provide six, six-channel portable transmitters. Program transmitters in accordance with Owner's directions at time of installation.
1. Provide one coaxial antenna per door installed below soffit and centered on door opening with stainless steel brackets, as indicated on drawings.
- I. Automatic Reversing Control: Provide each door with automatic safety sensor edge, located within neoprene or rubber astragal mounted to bottom door bar. Contact with bar shall immediately reverse downward door travel. Provide manufacturer's standard take-up reel or self-coiling cable.
1. Provide electrically or pneumatically actuated automatic bottom bar.
- J. Photoelectric Sensor: Provide each door with the following:
1. In addition to automatic bottom bar, provide watertight NEMA 4 design photoelectric system designed to detect an obstruction in door opening without contact between door and obstruction. Photoelectric system components shall be positioned to create a diagonal beam across each door opening. Verify mounting height with Architect prior to installation.
- K. Door Open Indicator Lights: Coordinate installation of electric door operators with installation of wall-mounted "fully open" indicator lights as shown on drawings.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. General: Install doors, tracks, and operating equipment complete with necessary hardware, jamb and head mold stops, anchors, inserts, hangers, and equipment supports according to shop drawings, manufacturer's instructions, and as specified.
- B. Fasten vertical track assembly to structure in accordance with shop drawings. Hang horizontal track from structural overhead framing with angle or channel hangers, bolt-fastened in place. Provide sway bracing, diagonal bracing, and reinforcing as required for rigid installation of track and door-operating equipment.
- C. After completing installation, including work by other trades, lubricate, test, and adjust doors to operate easily, free from warp, twist, or distortion and fitting weathertight for entire perimeter.
- D. Touch-up damaged coatings, finishes, and repair minor damage. Clean exposed surfaces using non-abrasive materials and methods recommended by manufacturer of material or product being cleaned.

3.3 DEMONSTRATION

- A. Startup Services: Engage a factory-authorized service representative to perform startup services and to train Owner's maintenance personnel as specified below:
1. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 2. Train Owner's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, and preventative maintenance.
 3. Review data in the maintenance manuals.
 4. Schedule training with Owner with at least 7 days' advance notice.

END OF SECTION 08361

SECTION 084113 – ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Exterior entrance and storefront systems (hurricane-resistant).
- B. Related sections include the following:
 - 1. Division 7 Section "Joint Sealants" for sealing between framing and masonry.
 - 2. Division 8 Section "Door Hardware" for lock cylinders.
 - 3. Division 8 Section "Glazing" for impact-resistant glass.

1.3 SYSTEM DESCRIPTION

- A. General: Provide aluminum storefront and entrance systems capable of withstanding loads and thermal and structural movement requirements indicated without failure, based on testing manufacturer's standard units in assemblies similar to those indicated for this Project. Failure includes the following:
 - 1. Air infiltration and water penetration exceeding specified limits.
 - 2. Framing members transferring stresses, including those caused by thermal and structural movement, to glazing units.
- B. Glazing: Physically and thermally isolate glazing from framing members.
- C. Wind Loads: Provide storefront and entrance systems, including anchorage, capable of withstanding wind-load design pressures calculated according to the requirements of the Florida Building Code and ASCE 7-2010.
 - 1. Positive and negative design wind pressures are as follows:
 - a. (+)33.4 psf; (-) 36.3 psf
 - 2. Deflection of framing members in a direction normal to wall plane is limited to 1/175 of clear span or 3/4 inch, whichever is smaller, unless otherwise indicated.
 - 3. Static-Pressure Test Performance: Provide storefront entrance systems that do not evidence material failures, structural distress, failure of operating components to function normally, or permanent deformation of main framing members exceeding 0.2 percent of clear span when tested according to ASTM E 330.

- a. Test Pressure: 150 percent of inward and outward wind-load design pressures.
 - b. Duration: As required by design wind velocity; fastest 1 mile of wind for relevant exposure category.
- D. Hurricane-Resistance Test Performance: Provide storefront entrance systems that pass large and small missile-impact tests, as required by systems' location above grade, and cyclic-pressure tests according to The Florida Building Code, Sections 1609 and 1626.
 1. Comply with Missile Level E Enhanced Protection requirements for Essential Facilities in accordance with ASTM E 1996.
- E. Dead Loads: Provide storefront entrance system members that do not deflect an amount which will reduce glazing bite below 75 percent of design dimension when carrying full dead load.
 1. Provide a minimum 1/8-inch clearance between members and top of glazing or other fixed part immediately below.
 2. Provide a minimum 1/16-inch clearance between members and operable windows and doors.
- F. Live Loads: Provide storefront entrance systems, including anchorage, that accommodate the supporting structures' deflection from uniformly distributed and concentrated live loads indicated without failure of materials or permanent deformation.
- G. Engineering Responsibility: Storefront subcontractor shall engage a Florida registered structural engineer to design connections, member reinforcements, and fastening to building structure, and prepare design calculations and engineering data.
- H. Air Infiltration: Test according to ASTM E 283 for infiltration as follows:
 1. Fixed Framing and Glass Area:
 - a. Maximum air leakage of 0.06 cfm/sq.ft. at a static-air-pressure differential of 1.57 lbf/sq.ft. (75 Pa).
 2. Entrance Doors:
 - a. Pairs of Doors: Maximum air leakage of 1.0 cfm/sq.ft. at a static-air-pressure differential of 1.57 lbf/sq.ft. (75 Pa).
 - b. Single Doors: Maximum air leakage of 0.5 cfm/sq.ft. at a static-air-pressure differential of 1.57 lbf/sq.ft. (75 Pa).
- I. Water Penetration: Provide entrance and storefront systems that do not evidence water leakage through fixed glazing and frame areas when tested according to ASTM E 331 at minimum differential pressure of 20 percent of inward-acting wind-load design pressure as defined by ASCE 7, "Minimum Design Loads for Buildings and Other Structures," but not less than 6.24 lbf/sq. ft. Water leakage is defined as follows:
 1. Uncontrolled water infiltrating systems or appearing on systems' normally exposed

interior surfaces from sources other than condensation. Water controlled by flashing and gutters that is drained back to the exterior and cannot damage adjacent materials or finishes is not water leakage.

- J. Thermal Movements: Provide storefront entrance systems, including anchorage, that accommodate thermal movements of systems and supporting elements resulting from the following maximum change (range) in ambient and surface temperatures without buckling, damaging stresses on glazing, failure of joint sealants, damaging loads on fasteners, failure of doors or other operating units to function properly, and other detrimental effects.
 - 1. Temperature Change (Range): 100 deg F ambient; 150 deg F material surfaces.
- K. Structural-Support Movement: Provide storefront entrance systems that accommodate structural movements including, but not limited to, sway and deflection.
- L. Dimensional Tolerances: Provide storefront entrance systems that accommodate dimensional tolerances of building frame and other adjacent construction.

1.4 SUBMITTALS

- A. Product Data: For each product specified. Include details of construction relative to materials, dimensions of individual components, profiles, and finishes.
- B. Shop Drawings: For storefront entrance systems. Show details of fabrication and installation, including plans, elevations, sections, details of components, provisions for expansion and contraction, and attachments to other work. Show elevations at 2 A scale and details at 3" scale.
 - 1. Shop drawings shall include large-scale anchorage details indicating attachment to slabs, walls, and overhead structure.
 - 2. Submit calculations, structural properties, connection information and product information to verify that the system performance and anchorage can successfully resist wind loads. All calculations shall be signed and sealed by a Florida registered professional structural engineer.
 - 3. For entrance systems, include hardware schedule and indicate operating hardware types, quantities, and locations.
 - 4. Shop drawings shall include State of Florida Product Approval applicable to actual sizes of doors indicated.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer to assume engineering responsibility and perform work of this Section who has specialized in installing storefront entrance systems similar to those required for this Project and who is acceptable to manufacturer.
 - 1. Engineering Responsibility: Prepare data for storefront entrance systems, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

- B. Source Limitations: Obtain each type of storefront entrance system through one source from a single manufacturer.
- C. Product Options: Drawings indicate size, profiles, and dimensional requirements of entrance and storefront systems and are based on the specific systems indicated.
 - 1. Do not modify intended aesthetic effect, as judged solely by Architect, except with Architect's approval and only to the extent needed to comply with performance requirements. Where modifications are proposed, submit comprehensive explanatory data to Architect for review.
- D. All exterior storefronts and storefront entrance doors shall bear the label of the National Fenestration Rating Council (NFRC) and shall comply with Chapters 3 and 4 of the Florida Building Code, Fifth Edition (2014), Energy Conservation. This project is located in International Climate Zone 2A. In Chapter 4, Section C407 – Total Building Performance is applicable.

1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1. CGI Estate Commercial Series 450 Doors.

2.2 MATERIALS

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated, complying with the requirements of standards indicated below.
 - 1. Sheet and Plate: ASTM B 209.
 - 2. Extruded Bars, Rods, Shapes, and Tubes: ASTM B 221.
 - 3. Extruded Structural Pipe and Tubes: ASTM B 429.
 - 4. Bars, Rods, and Wire: ASTM B 211.
- B. Steel Reinforcement: Complying with ASTM A 36 for structural shapes, plates, and bars; ASTM A 611 for cold-rolled sheet and strip; or ASTM A 570 for hot-rolled sheet and strip. Coat with corrosion-resistant primer.
- C. Glazing shall be provided by aluminum entrance manufacturer as follows:

1. Glass must be laminated glass product of the type included in the entrance assembly that was tested for hurricane resistance per the NOA.
 2. Refer to Section 088000 – Glazing, for impact-resistant, laminated glass specification.
- D. Glazing Gaskets: Manufacturer's standard pressure-glazing system of black, resilient glazing gaskets, setting blocks, and shims or spacers, fabricated from an elastomer of type and in hardness recommended by system and gasket manufacturer to comply with system performance requirements. Provide gasket assemblies that have corners sealed with sealant recommended by gasket manufacturer.
1. Provide silicone sealant in lieu of glazing gasket if required by entrance manufacturer for hurricane-resistant construction.
- E. Framing system gaskets, sealants, and joint fillers as recommended by manufacturer for joint type.

2.3 COMPONENTS

- A. Doors: Provide manufacturer's standard 1-3/4-inch-thick glazed doors with minimum 0.125-inch-thick, extruded tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deep penetration and fillet welded or that incorporate concealed tie-rods.
1. Glazing Stops and Gaskets: Provide manufacturer's standard snap-on extruded-aluminum glazing stops and preformed gaskets.
 2. Stile Design: Medium stile; 4-inch nominal width.
- B. Brackets and Reinforcements: Provide manufacturer's standard brackets and reinforcements that are compatible with adjacent materials. Provide nonstaining, nonferrous shims for aligning system components.
- C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
1. Reinforce members as required to retain fastener threads.
 2. Do not use exposed fasteners, except for hardware application. For hardware application, use countersunk Phillips flat-head machine screws finished to match framing members or hardware being fastened, unless otherwise indicated.
- D. Weather Stripping: Manufacturer's standard replaceable weather stripping as follows:
1. Compression Weather Stripping: Molded neoprene complying with ASTM D 2000 requirements or molded PVC complying with ASTM D 2287 requirements.
 2. Sliding Weather Stripping: Wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing complying with AAMA 701 requirements.

2.4 HARDWARE

- A. General: Provide heavy-duty hardware units indicated in sizes, number, and type recommended by manufacturer for entrances indicated.
- B. Ball-Bearing Butts: ANSI/BHMA A156.1, Grade 1, 5 knuckle, 4 1/2-by4-inch ball-bearing butts. Provide nonremovable pins at hinges exposed to door outside and provide nonferrous hinges for applications exposed to weather. Provide 3 hinges at each leaf for doors up to 36 inches wide and 80 inches tall; provide 4 hinges at each leaf for taller doors.
- C. Closers, General: Comply with manufacturer's recommendations for closer size, depending on door size, exposure to weather, and anticipated frequency of use.
 - 1. Closing Cycle: Comply with Florida Accessibility code for Building construction or the Americans with Disabilities Act (ADA), whichever is more stringent.
 - 2. Opening Force: Comply with the following maximum opening-force requirements for locations indicated:
 - a. Exterior Doors: 8.5 lbf.
 - 3. Hold Open: Adjustable.
- D. Surface-Mounted Overhead Closers: ANSI/BHMA A156.4, Grade 1.
- E. Door Stops: ANSI/BHMA A156.16, Grade 1, floor- or wall-mounted door stop, as appropriate for door location indicated, with integral rubber bumper.
- F. Mortise Cylinders: Cylinders are specified in Section 087100 - Door Hardware.
- G. Deadlatch Locks: Manufacturer's standard mortise deadlatch with minimum 2 inch long latch bolt and auxiliary bolt located below latch bolt and complying with ANSI/BHMA A156.5, Grade 1 requirements.
- H. Radius Face Strikes: Manufacturer's standard stainless-steel, radiused face strike with steel mounting plate and black-plastic dustbox.
- I. Vertical-Rod Exit Devices: At all doors, provide concealed, vertical-rod exit device complying with UL 305 requirements, with 2-point top and bottom latching that is released by a full-width crash bar or when locked down (dogged) by lock cylinder or retracting screws beneath housing.
 - 1. Device shall comply with hurricane-resistant entrance system requirements and must have been tested with the door as an approved assembly.
 - 2. Provide Jackson Exit Devices 2085 Series concealed rod exit device.
- J. Pull Handles: As selected by Architect from manufacturer's full range of pull handles and plates.
- K. Thresholds: At exterior doors, provide manufacturer's standard threshold with cutouts coordinated for operating hardware, with anchors and jamb clips, and not more than 1/2-inch- high, with beveled edges providing a floor level change with a slope of not more than 1:2, and in the following material:

1. Material: Aluminum, mill finish.

- L. Weather Sweeps: Manufacturer's standard weather sweep for application to exterior door bottoms and with concealed fasteners on mounting strips.

1. Provide sweeps, bulb gaskets, etc. to comply with water penetration requirements.

2.5 FABRICATION

- A. General: Fabricate components that, when assembled, will have accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

1. Fabricate components for screw-spline frame construction.

- B. Forming: Form shapes with sharp profiles, straight and free of defects or deformations, before finishing.

- C. Prepare components to receive concealed fasteners and anchor and connection devices.

- D. Fabricate components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior.

- E. Glazing Channels: Provide minimum clearances for thickness and type of glass indicated according to FGMA's "Glazing Manual."

- F. Metal Protection: 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. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

- G. Storefront: Fabricate framing in profiles indicated for flush glazing (without projecting stops). Provide subframes and reinforcing of types indicated or, if not indicated, as required for a complete, hurricane-resistant system. Factory assemble components to great extent possible. Disassemble components only as necessary for shipment and installation.

1. Frame dimensions to be 2-1/2" x 5" maximum.

- H. Entrances: Fabricate door framing in profiles indicated. Reinforce as required to support imposed loads. Factory assemble door and frame units and factory install hardware to greatest extent possible. Reinforce door and frame units as required for installing hardware indicated. Cut, drill, and tap for factory-installed hardware before finishing components.

1. Provide compression weatherstripping at fixed stops.

2.6 ALUMINUM FINISHES

- A. High-Performance Organic Finish: AA-C12C42R1x (Chemical Finish: cleaned with

inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

1. Fluoropolymer Two-Coat System: Manufacturer's standard two-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2605.
 - a. Color and Gloss: As selected by Architect from manufacturer's full range.

2.7 STEEL PRIMING FOR STEEL REINFORCEMENT

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying primer.
- B. Surface Preparation: Perform manufacturer's standard cleaning operations to remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel.
- C. Priming: Apply manufacturer's standard corrosion-resistant primer immediately after surface preparation and pretreatment.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of entrance and storefront systems. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Comply with manufacturer's written instructions for protecting, handling, and installing storefront entrance systems. Do not install damaged components. Fit frame joints to produce hairline joints free of burrs and distortion. Rigidly secure nonmovement joints. Seal joints watertight.
- B. Metal Protection: 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. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Install components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior.
- D. Set continuous sill members and flashing in a full sealant bed to provide weathertight

construction, unless otherwise indicated.

- E. Install framing components plumb and true in alignment with established lines and grades without warp or rack of framing members.
- F. Install entrances plumb and true in alignment with established lines and grades without warp or rack. Lubricate operating hardware and other moving parts according to hardware manufacturers' written instructions.
 - 1. Install doors to produce weathertight enclosure and tight fit at weatherstripping.
 - 2. Install hardware according to manufacturer's written instructions using concealed fasteners to greatest extent possible.
- G. Install glazing to comply with requirements of Division 8 Section "Glazing," unless otherwise indicated.
- H. Install perimeter sealant, using compatible backer rod where indicated on drawings to produce weathertight installation.
- I. Erection Tolerances: Install entrance and storefront systems to comply with the following maximum tolerances:
 - 1. Variation from Plane: Limit variation from plane or location shown to 1/8 inch in 12 feet; 1/4 inch over total length.
 - 2. Alignment: Where surfaces abut in line, limit offset from true alignment to 1/16 inch. Where surfaces meet at corners, limit offset from true alignment to 1/32 inch.
 - 3. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch.

3.3 ADJUSTING AND CLEANING

- A. Adjust doors and hardware to provide tight fit at contact points and weather stripping, smooth operation, and weathertight closure.
- B. Remove excess sealant and glazing compounds, and dirt from surfaces.

3.4 PROTECTION

- A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure storefront entrance systems are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 084113

SECTION 085200 - ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes Heavy-Commercial Grade aluminum windows of the performance class indicated. Window types required include the following:
 - 1. Horizontal sliding windows, hurricane-resistant.
- B. Related Sections include the following: Division 8 Section "Glazing" for glazing requirements for aluminum windows, including those specified to be factory glazed.

1.3 DEFINITIONS

- A. Performance class number, included as part of the window designation system, is the actual design pressure in pounds force per square foot (pascals) used to determine structural test pressure and water test pressure.
 - 1. Structural test pressure, wind load test, is equivalent to 150 percent of the design pressure.
 - 2. Water-leakage-resistance test pressure is equivalent to 15 percent of the design pressure with 2.86 lbf/sq. ft. (137 Pa) as a minimum for Residential, Commercial, and Heavy-Commercial Grade windows.

1.4 PERFORMANCE REQUIREMENTS

- A. General: Provide aluminum windows engineered, fabricated, and installed to withstand normal thermal movement, wind loading, and impact loading without failure, as demonstrated by testing manufacturer's standard window assemblies representing types, grades, classes, and sizes required for Project according to test methods indicated.
- B. Test Criteria: Testing shall be performed by a qualified independent testing agency based on the following criteria:
 - 1. Refer to structural drawings for table of positive and negative design wind pressures for doors and windows.

2. Test Procedures: Test window units according to ASTM E 283 for air infiltration, both ASTM E 331 and ASTM E 547 for water penetration, and ASTM E 330 for structural performance.
- C. Performance Requirements: Testing shall demonstrate compliance with requirements indicated in AAMA 101 for air infiltration, water penetration, and structural performance for type, grade, and performance class of window units required. Where required design pressure exceeds the minimum for the specified window grade, comply with requirements of AAMA 101, Section 3, "Optional Performance Classes," for higher than minimum performance class.
1. Air-Infiltration Rate for Operating Units: Not more than 0.20 cfm per square foot for an inward test pressure of 1.57 lbf/sq. ft.
 2. Water Penetration: No water penetration as defined in the test method at an inward test pressure of 15 percent of the design pressure.
 3. Structural Performance: No failure or permanent deflection in excess of 0.4 percent of any member's span after removing the imposed load, for positive (inward) and negative (outward) test pressures indicated on drawings.
 4. Thermal Movements: Provide window units that allow thermal movement resulting from the following maximum change (range) in ambient temperature when engineering, fabricating, and installing aluminum windows to prevent buckling, opening of joints, and overstressing of components, connections, and other detrimental effects. Base engineering calculation on actual surface temperatures of materials due to solar heat gain and nighttime sky heat loss.
 - a. Temperature Change (Range): 120 deg F, ambient; 180 deg F material surfaces.
- D. Wind Loads: Provide aluminum window system including anchorage to building capable of withstanding wind load design pressures as indicated:
1. Positive pressure = 35.1 p.s.f.
 2. Negative pressure = -47.0 p.s.f.
- E. Missile Impact Loads: Provide aluminum window system including anchorage to building capable of withstanding large and small missile impact loads in accordance with the Florida Building Code, Sections 1609 and 1626.
1. Comply with Missile Level E Enhanced Protection requirements for Essential Facilities in accordance with ASTM E 1996.
- 1.5 SUBMITTALS
- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

- B. Product Data for each type of window required, including the following:
 - 1. Construction details and fabrication methods.
 - 2. Profiles and dimensions of individual components.
 - 3. Data on hardware, accessories, and finishes.
 - 4. Recommendations for maintaining and cleaning exterior surfaces.

 - C. Shop Drawings showing fabrication and installation of each type of window required including information not fully detailed in manufacturer's standard Product Data and the following:
 - 1. Layout and installation details, including anchors.
 - 2. Elevations at 1/4 inch = 1 foot scale and typical window unit elevations at 3/4 inch = 1 foot scale.
 - 3. Full-size section details of typical composite members, including reinforcement and stiffeners.
 - 4. Location of weep holes.
 - 5. Panning details.
 - 6. Hardware, including operators.
 - 7. Glazing details.
 - 8. Accessories.
 - 9. Anchorage details at head, jamb, and sill.

 - D. Samples for initial color selection on 12-inch- long sections of window members. Where finishes involve normal color variations, include Sample sets showing the full range of variations expected.

 - E. Test reports from a qualified independent testing agency indicating that each type, grade, and size of window unit complies with performance requirements indicated based on comprehensive testing of current window units within the last 5 years. Test results based on use of down-sized test units will not be accepted.

 - F. Submit calculations, structural properties, connection information and product information to verify that system performance and anchorage complies with the loading criteria specified herein. All calculations shall be signed and sealed by a professional engineer registered in the State of Florida, whose discipline is structural engineering.

 - G. State of Florida Product Approval Number documentation.
- 1.6 QUALITY ASSURANCE
- A. Installer Qualifications: Engage an experienced Installer who has completed installation of aluminum windows similar in material, design, and extent to those required for this Project and with a record of successful in-service performance.

 - B. Single-Source Responsibility: Obtain aluminum windows from one source and by a single manufacturer.

- C. All exterior windows shall bear the label of the National Fenestration Rating Council (NFRC) and shall comply with Chapters 3 and 4 of the Florida Building Code, Fifth Edition (2014), Energy Conservation. This project is located in International Climate Zone 2A. In Chapter 4, Section C407 – Total Building Performance is applicable.

1.7 PROJECT CONDITIONS

- A. Field Measurements: Check window openings by field measurements before fabrication and show recorded measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Where field measurements cannot be made without delaying the Work, guarantee opening dimensions and proceed with fabricating aluminum windows without field measurements. Coordinate wall construction to ensure that actual opening dimensions correspond to guaranteed dimensions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Horizontal Sliding Windows:
 - a. CGI Windows and Doors, "Series 375 Aluminum Horizontal Rolling Window."

2.2 MATERIALS

- A. Aluminum Extrusions: Provide alloy and temper recommended by manufacturer for strength, corrosion resistance, and application of required finish, but not less than 22,000-psi ultimate tensile strength and not less than 0.062 inch thick at any location for main frame and sash members.
- B. Fasteners: Provide aluminum, nonmagnetic stainless steel, epoxy adhesive, or other materials warranted by manufacturer to be noncorrosive and compatible with aluminum window members, trim, hardware, anchors, and other components of window units.
 - 1. Reinforcement: Where fasteners screw anchor into aluminum less than 0.125 inch thick, reinforce interior with aluminum or nonmagnetic stainless steel to receive screw threads or provide standard, noncorrosive, pressed-in, splined grommet nuts.
 - 2. Exposed Fasteners: Except where unavoidable for application of hardware, do not use exposed fasteners. For application of hardware, use fasteners that match finish of member or hardware being fastened, as appropriate.

- C. Anchors, Clips, and Window Accessories: Fabricate anchors, clips, and window accessories of aluminum, nonmagnetic stainless steel, or hot-dip zinc-coated steel or iron complying with requirements of ASTM B 633; provide sufficient strength to withstand design pressure indicated.
- D. Sliding-Type Weatherstripping: Provide woven-pile weatherstripping of wool, polypropylene, or nylon pile and resin-impregnated backing fabric. Comply with AAMA 701.2.
- E. Sealant: For sealants required within fabricated window units, provide type recommended by manufacturer for joint size and movement. Sealant shall remain permanently elastic, nonshrinking, and nonmigrating. Comply with Division 7 Section "Joint Sealants" of these Specifications for selection and installation of sealants.
- F. Glass-Fiber-Mesh Insect Screen: 18-by-16 or 18-by-14 mesh of plastic-coated glass-fiber threads, woven and fused to form a fabric mesh resistant to corrosion, shrinkage, stretch, impact damage, and weather deterioration. Comply with requirements of ASTM D 3656.

2.3 HARDWARE

- A. General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, or other corrosion-resistant material compatible with aluminum and of sufficient strength to perform the function for which it is intended.

2.4 ACCESSORIES

- A. General: Provide manufacturer's standard accessories that comply with indicated standards.
- B. Insect Screens: Provide insect screens for each operable exterior sash or ventilator. Locate screens on inside or outside of window sash or ventilator, depending on window type. Design windows and hardware to accommodate screens in a tight-fitting, removable arrangement, with a minimum of exposed fasteners and latches.
 - 2. Screen Frames: Fabricate frames of tubular-shaped, extruded- or formed-aluminum members of 0.040-inch minimum wall thickness, with mitered or coped joints and concealed mechanical fasteners. Finish frames to match window units.
 - a. Provide removable PVC spline-anchor concealing edge of screen frame.
- C. Head and Jamb Closures: Provide manufacturer's standard extruded aluminum head and jamb closures compatible with frame profiles provided.

2.5 HORIZONTAL SLIDING WINDOWS

- A. Minimum Window Class and Grade: Comply with requirements of AAMA Performance Class HC-Heavy Commercial. Provide AAMA Performance Grade as required by wind pressures indicated on drawings. Window units shall successfully pass operating force test performance requirements specified in AAMA 101. Thermally broken construction is not required.
- B. Hardware: Provide the following equipment and operating hardware:
 - 1. Pair of quad rollers per operable panel.
 - 2. Egress Lock.
 - 3. 15 psf water bar adapter.

2.7 FABRICATION

- A. General: Fabricate aluminum window units to comply with indicated standards. Include a complete system for assembly of components and anchorage of window units.
 - 1. Provide units that are reglazable without dismantling sash or ventilator framing.
 - 2. Prepare window sash or ventilators for glazing, except where preglazing at the factory is indicated.
- B. Frames: Provide 3-7/8" minimum frame depth, with frame and sash extrusions of .062" minimum thickness, and with sill members of .094" minimum thickness. All horizontal rails shall be tubular.
- C. Mullions: Provide mullions and cover plates as shown, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections, as indicated.
- D. Glazing Stops: Provide screw-applied or snap-on glazing stops, coordinated with glass selection and glazing system indicated. Finish to match window units.
- E. Preglazed Fabrication: Preglaze window units at the factory where possible and practical for applications indicated. Comply with glass and glazing requirements of Division 8 Section "Glazing" of these Specifications and AAMA 101.

2.8 FINISHES

- A. Comply with NAAMM "Metal Finishes Manual" for recommendations relative to applying and designating finishes.
- B. Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.

- C. High-Performance Organic Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 1. Fluoropolymer Two-Coat System: Manufacturer's standard two-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2605.
 - a. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Inspect openings before installation. Verify that rough or masonry opening is correct and sill plate is level.
 - 1. Masonry surfaces shall be visibly dry and free of excess mortar, sand, and other construction debris.

3.2 INSTALLATION

- A. Comply with manufacturer's specifications and recommendations for installing window units, hardware, operators, and other components of the Work.
- B. Set window units plumb, level, and true to line, without warp or rack of frames or sash. Provide proper support and anchor securely in place.
 - 1. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials by complying with requirements specified under "Dissimilar Materials" Paragraph in appendix to AAMA 101.
 - 2. Set windows on .062" thick formed aluminum sill flashing provided by manufacturer, in finish to match windows.
- C. Set sill members and other members in a bed of sealant or with joint fillers or gaskets, as shown on Shop Drawings, to provide weathertight construction. Refer to Division 7 Section "Joint Sealants" for compounds, fillers, and gaskets to be installed concurrently with window units. Coordinate installation with wall flashings and other components of the Work.

3.3 ADJUSTING

- A. Adjust operating sash and hardware to provide a tight fit at contact points and at weatherstripping for smooth operation and a weathertight closure.

3.4 CLEANING

- A. Clean aluminum surfaces promptly after installing windows. Exercise care to avoid damage to protective coatings and finishes. Remove excess glazing and sealant compounds, dirt, and other substances. Lubricate hardware and other moving parts.
- B. Clean glass of preglazed units promptly after installing windows. Comply with requirements of Division 8 Section "Glazing" for cleaning and maintenance.

3.5 PROTECTION

- A. Provide final protection and maintain conditions, in a manner acceptable to aluminum window manufacturer, that ensure window units are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 085200

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This section includes items known commercially as finish or door hardware that are required for swing, sliding, and folding doors, except special types of unique hardware specified in the same sections as the doors and door frames on which they are to be installed.
- B. This Section includes the following:
 - 1. Hinges.
 - 2. Key control systems.
 - 3. Lock cylinders and keys.
 - 4. Lock and latch sets.
 - 5. Bolts.
 - 6. Exit devices.
 - 7. Push/pull units.
 - 8. Closers.
 - 9. Overhead holders.
 - 10. Miscellaneous door control devices.
 - 11. Protection plates.
 - 12. Weatherstripping for exterior doors.
 - 13. Astragals or meeting seals on pairs of doors.
 - 14. Thresholds.
- C. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 6 Section "Laminated Plastic Casework".
 - 2. Division 8 Section "Standard Steel Doors and Frames".
 - 3. Division 8 Section "Flush Wood Doors".
 - 4. Division 8 Section "Aluminum Entrances and Storefronts".
- D. Windstorm product approval requirements:
 - 1. Hardware, except keyed cylinders, listed for entrance doors in this section is to indicate quality level and function required at each opening. Specific items listed may be modified as required to maintain windstorm product approvals for exterior openings, but in no case shall materials of lesser quality or different function be acceptable.

1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification sections.
- B. Product data including manufacturer's technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
- C. Final hardware schedule coordinated with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
 - 1. Final Hardware Schedule Content: Based on hardware indicated, organize schedule into "hardware sets" indicating complete designations of every item required for each door or opening. Include the following information:
 - a. Type, style, function, size, and finish of each hardware item.
 - b. Name and manufacturer of each item.
 - c. Fastenings and other pertinent information.
 - d. Location of each hardware set cross referenced to indications on Drawings, both on floor plans and in door and frame schedule.
 - e. Explanation of all abbreviations, symbols, and codes contained in schedule.
 - f. Mounting locations for hardware.
 - g. Door and frame sizes and materials.
 - h. Keying information.
 - 2. Submittal Sequence: Submit final schedule at earliest possible date, particularly where acceptance of hardware schedule must precede fabrication of other work that is critical in the Project construction schedule. Include with schedule the product data, samples, shop drawings of other work affected by door hardware, and other information essential to the coordinated review of schedule.
 - 3. Keying Schedule: Submit separate detailed schedule indicating clearly how the Owner's final instructions on keying of locks has been fulfilled.
- D. Submit samples of each type of exposed hardware unit as required in finish indicated and tagged with full description for coordination with schedule. Submit samples prior to submission of final hardware schedule.
 - 1. Samples will be returned to the supplier. Units that are acceptable and remain undamaged through submittal, review, and field comparison process may, after final check of operation, be incorporated in the Work, within limitations of keying coordination requirements.
- E. Templates for doors, frames, and other work specified to be factory prepared for the installation of door hardware. Check shop drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- F. For each electrified opening, provide complete wiring diagrams prepared by an authorized factory employee. Provide complete operational descriptions of electronic components listed by opening in the hardware submittals. Operational descriptions to

detail how each electrical component functions within the opening incorporating all conditions of ingress and egress. Provide elevation drawings of electronic hardware and systems identifying locations of the system components with respect to their placement in the door opening. Provide a copy with each hardware schedule submitted for approval. Wiring diagrams may be submitted after approval of hardware schedule.

1.4 QUALITY ASSURANCE

- A. Single Source Responsibility: Obtain each type of hardware (latch and lock sets, hinges, closers, etc.) from a single manufacturer.
- B. Supplier Qualifications: A recognized architectural door hardware supplier, with warehousing facilities in the Project's vicinity, that has a record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project and that employs an experienced architectural hardware consultant (AHC) who is available to Owner, Architect, and Contractor, at reasonable times during the course of the Work, for consultation.
 - 1. Require supplier to meet with Owner to finalize keying requirements and to obtain final instructions in writing.
- C. Fire-Rated Openings: Provide door hardware for fire-rated openings that complies with NFPA Standard No. 80 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed and are identical to products tested by UL, Warnock Hersey, FM, or other testing and inspecting organization acceptable to authorities having jurisdiction for use on types and sizes of doors indicated in compliance with requirements of fire-rated door and door frame labels. All fire seals required for fire rated wood doors shall be furnished by the door manufacturer or supplier.
- D. Disabled Accessibility: Provide hardware that complies with all accessibility codes as they pertain to this project, including the Americans with Disabilities Act Accessibility Guidelines and the Florida Accessibility Code for Building Construction.
- E. Exterior Openings: All doors, frames and hardware for exterior openings shall be tested and approved for use at the required wind loads for this project. Copies of current valid Florida State or Metro-Dade County product approvals shall be furnished as proof of compliance with this requirement.

1.5 PRODUCT HANDLING

- A. Tag each item or package separately with identification related to final hardware schedule, and include basic installation instructions with each item or package.
- B. Packaging of door hardware is responsibility of supplier. As material is received by hardware supplier from various manufacturers, sort and repackage in containers clearly marked with appropriate hardware set number to match set numbers of approved hardware schedule. Two or more identical sets may be packed in same container.
- C. Inventory door hardware jointly with representatives of hardware supplier and hardware installer until each is satisfied that count is correct.

- D. Deliver individually packaged door hardware items promptly to place of installation (shop or Project site).
- E. Provide secure lock-up for door hardware delivered to the Project, but not yet installed. Control handling and installation of hardware items that are not immediately replaceable so that completion of the Work will not be delayed by hardware losses both before and after installation.

1.6 MAINTENANCE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Butts and Hinges:
 - a. Hager Hinge Co.
 - b. McKinney Products Co, an ASSA ABLOY Group Company.
 - c. Stanley Hardware, Div. Stanley Works.
 - 2. Pivots
 - a. Rixson, an ASSA ABLOY Group company.
 - 3. Key Control System
 - a. Telkee Inc.
 - b. Lund Equipment Company, Inc.
 - c. MMF Industries
 - 4. Cylinders and Locks:
 - a. Schlage IR Security and Safety. L9000 series, 03A trim.
 - b. Corbin Russwin Architectural Hardware, an ASSA ABLOY Group Company ML2000 Series, LSA trim
 - 5. Bolts
 - a. Corbin Russwin Architectural Hardware, an ASSA ABLOY Group Company.
 - b. McKinney Products Co, an ASSA ABLOY Group Company.
 - c. Rockwood Manufacturing.
 - d. Triangle Brass Manufacturing Company (TRIMCO).

6. Exit/Panic Devices
 - a. Von Duprin, IR Security and Safety. 98 series, 03 lever trim.
 - b. Corbin Russwin Architectural Hardware, an ASSA ABLOY Group Company 5000 Series, Lustra lever trim
7. Push/Pull Units:
 - a. Rockwood Manufacturing, as ASSA ABLOY Group Company
 - b. Triangle Brass Manufacturing Company (Trimco).
 - c. Ives, IR security and Safety
8. Overhead Closers:
 - a. Corbin Russwin Architectural Hardware, an ASSA ABLOY Group Company. DC6000 series.
 - b. LCN, IR Security and Safety. 4041 series.
 - c. Norton Door Controls, an ASSA ABLOY Group Company. 7500 series.
9. Door Control Devices:
 - a. Glynn-Johnson, IR Security and Safety.
 - b. Ives, IR Security and Safety.
 - c. McKinney Products Co, an ASSA ABLOY Group Company.
 - d. Rixson Specialty Door Controls, an ASSA ABLOY Group Company.
 - e. Rockwood Manufacturing ,an ASSA ABLOY Group Company
 - f. Triangle Brass Manufacturing Company (Trimco).
10. Kick, Mop, and Armor Plates:
 - a. Ives, IR Security and Safety.
 - b. Rockwood Manufacturing.
 - c. Triangle Brass Manufacturing Company (Trimco).
11. Door Stripping and Seals:
 - a. National Guard Products, Inc.
 - b. Pemko Manufacturing Co., Inc.
 - c. Reese Enterprises, Inc.
 - d. Zero International, Inc.
12. Thresholds:
 - a. National Guard Products, Inc.
 - b. Pemko Manufacturing Co., Inc.
 - c. Reese Enterprises Inc.
 - d. Zero International, Inc.

13. Astragals:

- a. National Guard Products, Inc.
- b. Pemko Manufacturing Co. Inc.
- c. Reese Enterprises, Inc.
- d. McKinney Products Co, an ASSA ABLOY Group Company.
- e. Zero International, Inc.

2.2 SCHEDULED HARDWARE

A. Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of finish hardware are indicated in the "Hardware Schedule" at the end of this Section. Products are identified by using hardware designation numbers of the following:

1. Manufacturer's Product Designations: The product designation and name of one manufacturer are listed for each hardware type required for the purpose of establishing minimum requirements. Provide either the product designated or, where more than one manufacturer is specified under the Article "Manufacturers" in Part 2 for each hardware type, the comparable product of one of the other manufacturers that complies with requirements.
2. ANSI/BHMA designations used elsewhere in this Section or in schedules to describe hardware items or to define quality or function are derived from the following standards. Provide products complying with these standards and requirements specified elsewhere in this Section.
 - a. Butts and Hinges: ANSI/BHMA A156.1-06.
 - b. Bored and Preassembled Locks and Latches: ANSI/BHMA A156.2-03.
 - c. Exit Devices: ANSI/BHMA A156.3-01.
 - d. Door Controls - Closers: ANSI/BHMA A156.4-00.
 - e. Auxiliary Locks and Associated Products: ANSI/BHMA A156.5-01.
 - f. Architectural Door Trim: ANSI/BHMA A156.6-05.
 - g. Template Hinge Dimensions: ANSI/BHMA A156.7-03.
 - h. Door Controls - Overhead Stops and Holders: ANSI/BHMA A156.8-05.
 - i. Interconnected Locks and Latches: ANSI/BHMA A156.12-05.
 - j. Mortise Locks and Latches Series 1000: ANSI/BHMA A156.13-05.
 - k. Sliding and Folding Door Hardware: ANSI/BHMA A156.14-07.
 - l. Release Devices – Closer Holder, Electromagnetic and Electromechanical: ANSI/BHMA A156.15-06.
 - m. Auxiliary Hardware: ANSI/BHMA A156.16-02.
 - n. Self-Closing Hinges and Pivots: ANSI/BHMA A156.17-04.
 - o. Recommended Practices for Materials and Finishes: ANSI/BHMA A156.18-06.
 - p. Power Assist and Low Energy Operated Doors: ANSI/BHMA A156.19-07.
 - q. Strap and Tee Hinges and Hasps: ANSI/BHMA A156.20-06.
 - r. Thresholds: ANSI/BHMA A156.21-06.
 - s. Door Gasketing and Edge Seal Systems: ANSI/BHMA A156.22-05.
 - t. Electromagnetic Locks: ANSI/BHMA A156.23-04.

- u. Delayed Egress Locking Systems: ANSI/BHMA A156.24-03.
- v. Electrified Locking Devices: ANSI/BHMA A156.25-02.
- w. Continuous Hinges: ANSI/BHMA A156.27-06.
- x. Recommended Practices for Keying Systems: ANSI/BHMA A156.28.07.
- y. Exit Locks, Exit Locks with Exit Alarms, Exit Alarms, Alarms for Exit Devices: ANSI/BHMA A156.29-07.
- z. High Security Cylinders: ANSI/BHMA A156.30-03.
- aa. Electric Strikes and Frame Mounted actuators: ANSI/BHMA A156.31-07.

2.3 MATERIALS AND FABRICATION

- A. Manufacturer's Name Plate: Do not use manufacturers' products that have manufacturer's name or trade name displayed in a visible location (omit removable nameplates) except in conjunction with required fire-rated labels and as otherwise acceptable to Architect.
 - 1. Manufacturer's identification will be permitted on rim of lock cylinders only.
- B. Base Metals: Produce hardware units of basic metal and forming method indicated using manufacturer's standard metal alloy, composition, temper, and hardness, but in no case of lesser (commercially recognized) quality than specified for applicable hardware units for finish designations indicated.
- C. Fasteners: Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation. Do not provide hardware that has been prepared for self-tapping sheet metal screws, except as specifically indicated.
- D. Furnish screws for installation with each hardware item. Provide Phillips flat-head screws except as otherwise indicated. Finish exposed (exposed under any condition) screws to match hardware finish or, if exposed in surfaces of other work, to match finish of this other work as closely as possible including "prepared for paint" surfaces to receive painted finish.
- E. Provide concealed fasteners for hardware units that are exposed when door is closed except to the extent no standard units of type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt head or nut on opposite face is exposed in other work unless their use is the only means of reinforcing the work adequately to fasten the hardware securely. Where thru-bolts are used as a means of reinforcing the work, provide sleeves for each thru-bolt or use sex screw fasteners.
- F. Electrified Hardware: For each item of electrified hardware specified, provide standardized Molex™ plug connectors to accommodate up to eight (8) wires or as required. Molex™ plug connectors shall plug directly into through-door wiring harnesses, frame wiring harnesses, electric locking devices and power supplies. Provide an Operation Narrative for each electrified hardware opening.

2.4 HINGES, BUTTS, AND PIVOTS

- A. Templates: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units.

- B. Screws: Provide Phillips flat-head screws complying with the following requirements:
 - 1. For metal doors and frames install machine screws into drilled and tapped holes.
 - 2. For wood doors and frames install wood screws.
 - 3. For fire-rated wood doors install #12 x 1-1/4-inch, threaded-to-the-head steel wood screws.
 - 4. Finish screw heads to match surface of hinges or pivots.
- C. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
 - 1. Out-Swing Exterior Doors: Non-removable pins.
 - 2. Out-Swing Corridor Doors with Locks: Non-removable pins.
 - 3. Interior Doors: Non-rising pins.
 - 4. Tips: Flat button and matching plug, finished to match leaves, except where hospital tip (HT) is indicated.
- D. Number of Hinges: Provide number of hinges indicated but not less than 3 hinges per door leaf for doors 90 inches or less in height and one additional hinge for each 30 inches of additional height.
 - 1. Fire-Rated Doors: Not less than 3 hinges per door leaf for doors 86 inches or less in height with same rule for additional hinges.

2.5 LOCK CYLINDERS AND KEYING

- A. Standard System: Except as otherwise indicated, provide new masterkey system for Project.
- B. Equip locks with manufacturer's special 6-pin tumbler cylinder with construction masterkey feature that permits voiding of construction keys without cylinder removal.
- C. Equip locks with cylinders for interchangeable-core pin tumbler inserts. Furnish only temporary inserts for the construction period, and remove these when directed. Furnish for all exit devices that would require dismantling of device in order to change keying of cylinder.
- D. Metals: Construct lock cylinder parts from brass or bronze, stainless steel, or nickel silver.
- E. Comply with Owner's instructions for masterkeying and, except as otherwise indicated, provide individual change key for each lock that is not designated to be keyed alike with a group of related locks.
 - 1. Permanently inscribe each key with number of lock that identifies cylinder manufacturer's key symbol, and notation, "DO NOT DUPLICATE".
- F. Key Material: Provide keys of nickel silver only.
- G. Key Quantity: Furnish 3 change keys for each lock, 6 master keys for each master system, and 6 grandmaster keys for each grandmaster system.

1. Furnish one extra blank for each lock.
2. Furnish ten construction Keys.
3. Furnish three control keys for construction cores to remove / insert construction cores.
4. Furnish two control keys for permanent cores to remove / insert permanent cores.
5. Deliver all permanent keys to Owner.

2.6 KEY CONTROL SYSTEM

- A. Provide a key control system including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended by system manufacturer, with capacity for 150 percent of the number of locks required for the Project.
1. Provide hinged-panel type cabinet for wall mounting; install where directed by Owner.

2.7 LOCKS, LATCHES, AND BOLTS

- A. Strikes: Provide manufacturer's standard wrought box strike for each latch or lock bolt, with curved lip extended to protect frame, finished to match hardware set, unless otherwise indicated.
1. Provide flat curved lip strikes for locks with 3-piece, anti-friction latchbolts as recommended by manufacturer.
 2. Provide extra long strike lips for locks used on frames with applied wood casing trim. Provide special strike lip for pairs of doors to allow astragal to be applied without modification or conflict with strike.
 3. Provide recess type top strikes for bolts locking into frame heads, unless otherwise indicated.
 4. Provide dust-proof strikes for foot bolts, except where special threshold construction provides non-recessed strike for bolt.
 5. Provide roller type strikes where recommended by manufacturer of the latch and lock units.
 6. Provide standard (open) strike plates for interior doors of residential units where wood door frames are used.
- B. Lock Throw: Provide 3/4-inch minimum throw of latch on pairs of doors. Comply with UL requirements for throw of bolts and latch bolts on rated fire openings.
1. Provide 1/2-inch minimum throw of latch for other bored and pre-assembled types of locks and 3/4-inch minimum throw of latch for mortise locks. Provide 1-inch minimum throw for all dead bolts.
- C. Flush Bolt Heads: Minimum of 1/2-inch-diameter rods of brass, bronze, or stainless steel with minimum 12-inch-long rod for doors up to 7'-0" in height. Provide longer rods as necessary for doors exceeding 7'-0" in height.
- D. Exit Device Dogging: Except on fire-rated doors where closers are provided on doors equipped with exit devices, equip the units with keyed dogging device to keep the latch

bolt retracted, when engaged.

- E. Rabbeted Doors: Where rabbeted door stiles are indicated, provide special rabbeted front on lock and latch units and bolts.

2.8 PUSH/PULL UNITS

- A. Concealed Fasteners: Provide manufacturer's special concealed fastener system for installation, thru-bolted for matched pairs but not for single units.

2.9 CLOSERS AND DOOR CONTROL DEVICES

- A. Size of Units: Except as otherwise specifically indicated, furnish units that are adjustable through a range of sizes (1 – 6).

1. Provide parallel arms for all overhead closers, except as otherwise indicated.

- B. Provide heavy duty forged arms as listed. Where closers are indicated to be closer/stop, provide units with a rigid arm assembly and a heavy duty bracket with built-in lug to provide a means of positive stop. For closers where indicated to have spring stop, furnish a heavy duty bracket with spring to allow a cushion prior to door stopping. For closer/holders, provide units with an additional built-in holder designed to hold open against normal wind and traffic conditions. Holder shall be activated manually. For closers listed with Unitrol arms, provide the closer arms with a five degree cushion stop with stop locate on the arm, not the bracket. As an alternate to Unitrol arms, the supplier may furnish solid heavy duty forged arms with appropriate bracket and a heavy duty overhead stop and holder.

- C. Access-Free Manual Closers: Where manual closers are indicated for doors required to be accessible to the physically handicapped, provide adjustable units complying with ANSI A117.1 provisions for door opening force and delayed action closing.

- D. Provide black resilient parts for exposed bumpers.

2.10 DOOR TRIM UNITS

- A. Fasteners: Provide manufacturer's standard exposed fasteners for door trim units consisting of either machine screws or self-tapping screws.

- B. Fabricate protection plates not more than 2 inches less than door width on hinge side and not more than 2 inch less than door width on pull side by height indicated.

1. Metal Plates: Stainless steel, 0.050 inch(U.S. 18 gage).

2. Metal Plates: Polished Aluminum with diamond pattern, 0.125 inch where indicated.

2.11 WEATHERSTRIPPING AND SEALS

- A. General: Provide continuous weatherstripping on exterior doors and smoke, light, or sound seals on interior doors where indicated or scheduled. Provide non-corrosive fasteners for exterior applications and elsewhere as indicated.

- B. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strip is easily replaceable and readily available from stocks maintained by manufacturer.
- C. Weatherstripping, door bottoms, and thresholds shall resist air infiltration in accordance with the requirements of Table C402.3 of the Florida Building Code – Energy Conservation, 5th Edition (2014). Testing shall be in accordance with the applicable reference test standard by an accredited, independent testing laboratory and labeled by the manufacturer. Submit certification by a qualified independent testing laboratory indicating compliance with infiltration resistance requirements at the time of hardware product submittal

2.12 THRESHOLDS

- A. General: Except as otherwise indicated, provide standard metal threshold unit of type, size, and profile as shown or scheduled.

2.13 HARDWARE FINISHES

- A. Match items to the manufacturer's standard color and texture finish for the latch and lock sets (or push-pull units if no latch or lock sets).
- B. Provide finishes that match those established by BHMA or, if none established, match the Architect's sample.
- C. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.
- D. Provide protective lacquer coating on all exposed hardware finishes of brass, bronze, and aluminum, except as otherwise indicated. The suffix A-NL@ is used with standard finish designations to indicate "no lacquer".
- E. The designations used in schedules and elsewhere to indicate hardware finishes are those listed in ANSI/BHMA A156.18, "Materials and Finishes", including coordination with the traditional U.S. finishes shown by certain manufacturers for their products.
- F. The designations used in schedules and elsewhere to indicate hardware finishes are the industry-recognized standard commercial finishes, except as otherwise noted.
 - 1. Rust-Resistant Finish: For iron and steel base metal required for exterior work and in areas shown as "High Humidity" areas (and also when designed with the suffix-RR), provide 0.2-mil-thick copper coating on base metal before applying brass, bronze, nickel, or chromium plated finishes.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Mount hardware units at heights indicated in following applicable publications, except

as specifically indicated or required to comply with governing regulations and except as otherwise directed by Architect.

1. "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames" by the Door and Hardware Institute.
 2. WDMA Industry Standard I.S.1.7, "Hardware Locations for Wood Flush Doors".
- B. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Where cutting and fitting is required to install hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation or application of surface protection with finishing work specified in the Division 9 Sections. Do not install surface-mounted items until finishes have been completed on the substrates involved.
- C. Set units level, plumb, and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
- D. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
- E. Set thresholds for exterior doors in full bed of butyl-rubber or polyisobutylene mastic sealant complying with requirements specified in Division 7 Section "Joint Sealers".
- F. Weatherstripping and Seals: Comply with manufacturer's instructions and recommendations to the extent installation requirements are not otherwise indicated.

3.2 ADJUSTING, CLEANING, AND DEMONSTRATING

- A. Adjust and check each operating item of hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate freely and smoothly or as intended for the application made.
1. Where door hardware is installed more than one month prior to acceptance or occupancy of a space or area, return to the installation during the week prior to acceptance or occupancy and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.
- B. Clean adjacent surfaces soiled by hardware installation.
- C. Instruct Owner's personnel in the proper adjustment and maintenance of door hardware and hardware finishes.
- D. Six-Month Adjustment: Approximately six months after the date of Substantial Completion, the Installer, accompanied by representatives of the manufacturers of latchsets and locksets and of door control devices, and of other major hardware suppliers, shall return to the Project to perform the following work:
1. Examine and re-adjust each item of door hardware as necessary to restore function of doors and hardware to comply with specified requirements.

2. Consult with and instruct Owner’s personnel in recommended additions to the maintenance procedures.
3. Replace hardware items that have deteriorated or failed due to faulty design, materials, or installation of hardware units.
4. Prepare a written report of current and predictable problems (of substantial nature) in the performance of the hardware.

3.3 HARDWARE SCHEDULE

- A. General: Provide hardware for each door to comply with requirements of Section “Door Hardware”, hardware set numbers indicated in door schedule, and in the following schedule of hardware sets.
1. Hardware sets indicate quantity, item, manufacturer and product designation, size, and finish or color, as applicable.

Manufacturer List

<u>Code</u>	<u>Name</u>
AD	Adams Rite
CR	Corbin Russwin
MC	McKinney
LN	LCN Closers
NO	Norton
PE	Pemko
SC	Schlage
RO	Rockwood
RX	Rixson
VO	Von Duprin

HARDWARE SETS

SET 1.1

Doors: X101

Each to have:

1 set	Pivots	147		626
	RX			
1	Int. Pivot	M19		626
	RX			
1	Rim Exit Device	XP98L	996L	630
	VO			
1	I C Cylinder	As Required		626
	SC			
1	Surface Closer	4041PA-EDA		AL
	LN			
1	Weather Seal	By Door Mfg.		

1 Threshold By Door Mfg.

NOTE: Hardware listed is basis of design. All exterior openings to comply with FBC windload requirements as per Para.1.2.D.1

SET 1.2

Doors: X120

Each to have:

3	Hinges MC	T4B2314-NRP	4 1/2 x 4 1/2	630
1	Rim Exit Device VO	XP98L	996L	630
1	I C Cylinder SC	As Required		626
1	Surface Closer LN	4041-EDA	PA As Required	AL
1	Kick Plate RO	K1050	10 x 2" LDW	630
1	Weather Seal PE	296CR	LAR	AL
1	Threshold PE	2005AV	LAR	AL
1	Door Sweep PE	321CN	LAR	AL
1	Rain Guard PE	347A	LAR	AL
1	Guard Seal PE	68AR	LAR	AL

NOTE: Hardware listed is basis of design. All exterior openings to comply with FBC windload requirements as per Para.1.2.D.1

SET 1.3

Doors: X112

Each to have:

3	Hinges MC	T4B2314-NRP	4 1/2 x 4 1/2	630
1	Ext Lockset SC	L9453R	17A	630
1	Surface Closer LN	4041-EDA	PA As Required	AL
1	Kick Plate RO	K1050	10 x 2" LDW	630

1	Door Viewer RO	622		US32D
1	Weather Seal PE	296CR	LAR	AL
1	Threshold PE	2005AV	LAR	AL
1	Door Sweep PE	321CN	LAR	AL
1	Rain Guard PE	347A	LAR	AL
1	Guard Seal PE	68AR	LAR	AL

NOTE: Hardware listed is basis of design. All exterior openings to comply with FBC windload requirements as per Para.1.2.D.1

SET 1.4

Doors: X114
Each to have:

3	Hinges MC	T4B2314-NRP	4 1/2 x 4 1/2	630
1	Ext Lockset SC	L9480R	17A	630
1	Surface Closer LN	4041-EDA	PA As Required	AL
1	Kick Plate RO	K1050	10 x 2" LDW	630
1	Weather Seal PE	296CR	LAR	AL
1	Threshold PE	2005AV	LAR	AL
1	Door Sweep PE	321CN	LAR	AL
1	Rain Guard PE	347A	LAR	AL
1	Guard Seal PE	68AR	LAR	AL

NOTE: Hardware listed is basis of design. All exterior openings to comply with FBC windload requirements as per Para.1.2.D.1

SET 1.5

Doors: X115 - X116
Each to have:

6	Hinges MC	TA2314-NRP	4 1/2 x 4 1/2	630
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2	Surface Bolts RO	580	12"	630
1	Storeroom Lock SC	L9480R	17A	630
2	Overhead Holders RO	19000 Series		630
1	Weather Seal PE	296CR	LAR	AL
1	Threshold PE	177AV	LAR	AL
1	Door Sweep PE	321CN	LAR	AL
1	Rain Guard PE	347A	LAR	AL
1	Guard Seal PE	68AR	LAR	AL

NOTE: Hardware listed is basis of design. All exterior openings to comply with FBC windload requirements as per Para.1.2.D.1

SET 1.6

Doors: X105

Each to have:

3	Hinges MC	T4B2314-NRP	4 1/2 x 4 1/2	630
1	Ext Lockset SC	L9453R	17A	630
1	Surface Closer LN	4041-EDA	PA As Required	AL
1	Kick Plate RO	K1050	10 x 2" LDW	630
1	Weather Seal PE	296CR	LAR	AL
1	Threshold PE	2005AV	LAR	AL
1	Door Sweep PE	321CN	LAR	AL
1	Rain Guard PE	347A	LAR	AL
1	Guard Seal PE	68AR	LAR	AL

NOTE: Hardware listed is basis of design. All exterior openings to comply with FBC windload requirements as per Para.1.2.D.1

SET 2.1

Doors: 101

Each to have:

3	Hinges MC	T4B3786	4 1/2 x 4 1/2	652
1	Rim Exit Device VO	98L	996L	630
1	I C Cylinder SC	As Required		626
1	Surface Closer LN	4041	PA as required	AL
1	Kick Plate RO	K1050	10 x 2" LDW	630
1	Wall Stop RO	400 Series		630
3	Silencers			

SET 2.2

Doors: 131 - 131A

Each to have:

3	Hinges MC	T4B3786	4 1/2 x 4 1/2	652
1	Rim Exit Device VO	98L-F	996L	630
1	I C Cylinder SC	As Required		626
1	Surface Closer LN	4041	PA as required	AL
1	Armor Plate	Custom Design Furnished by General Contractor – See Sheet A4.1		
1	Smoke Seal PE	296CR	LAR	AL
1	Door Sweep PE	321CN	LAR	AL
1	Threshold PE	2005AV	LAR	AL

SET 3.1

Doors: 103

Each to have:

3	Hinges MC	TB2714	4 1/2 x 4 1/2	652
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1	Office Lock SC	L9050R	17A	630
1	H O Surface Closer LN	4041H	PA as required	AL
1	Kick Plate RO	K1050	10 x 2" LDW	630
1	Wall Stop RO	400 Series		630
3	Silencers			

SET 3.2

Doors: 133

Each to have:

3	Hinges MC	TB2714	4 1/2 x 4 1/2	652
1	Storeroom Lock SC	L9080R	17A	630
1	Surface Closer LN	4041	PA as required	AL
1	Kick Plate RO	K1050	10 x 2" LDW	630
1	Wall Stop RO	400 Series		630
3	Silencers			

SET 3.3

Doors: 130 - 134 - 135

Each to have:

3	Hinges MC	TB2714	4 1/2 x 4 1/2	652
1	Classroom Lock SC	L9070R	17A	630
1	H O Surface Closer LN	4041H	PA as required	AL
1	Kick Plate RO	K1050	10 x 2 " LDW	630
1	Threshold PE	2005AV	LAR	AL
1	Door Bottom PE	321CN	LAR	AL
3	Silencers			

SET 3.4

Doors: 112 - 114 - 115

Each to have:

3	Hinges MC	TB2714	4 1/2 x 4 1/2	652
1	Privacy Lock SC	L9440	17A	630
1	Surface Closer LN	4041	PA as required	AL
1	Kick Plate RO	K1050	10 x 2" LDW	620
1	Wall Stop RO	400 Series		630
3	Silencers			

SET 3.5

Doors: 104 - 111 - 111A

Each to have:

3	Hinges MC	TB2714	4 1/2 x 4 1/2	652
1	Passage SC	L9010	17A	630
1	Surface Closer LN	4041	PA as required	AL
1	Kick Plate RO	K1050	10 x 2" LDW	630
1	Wall Stop	400 Series		630 RO
3	Silencers			

SET 4.1

Doors: 116

Each to have:

3	Hinges MC	T2714	4 1/2 x 4 1/2	652
1	Office Lock SC	L9050R	17A	630
1	Wall Stop RO	400 Series		630
3	Silencers			

SET 4.2

Doors: 107 - 108 - 109 - 110

Each to have:

3	Hinges MC	TB2714	4 1/2 x 4 1/2	652
1	Office Lock SC	L9050R	17A	630
1	Overhead Stop RO	14000 Series		630
3	Silencers			

SET 4.3

Doors: 113 - 129 - 132
Each to have:

3	Hinges MC	T2714	4 1/2 x 4 1/2	652
1	Storeroom Lock SC	L9080R	17A	630
1	Wall Stop RO	400 Series		630
3	Silencers			

SET 4.4

Doors: 118 - 119 - 120 - 121 - 122 - 123 - 124 - 125
Each to have:

3	Hinges MC	T2714	4 1/2 x 4 1/2	652
1	Passage Latch SC	L9010	17A	630
1	Wall Stop RO	400 Series		630
3	Silencers			

SET 5.1

Doors: 117
 Each to have:

1	Pocket Door Frame Kit PE	PF2800 Series	LAR	
2	Flush Pulls RO	872		626
1	Edge Pull RO	880		626

SET 5.2

Doors: X117 - X118 - X119 - X122 - X123 - X124 - 103A - 103B
 Each to have:

Complete hardware by door mfg.

END OF SECTION

SECTION 088000 - GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes glazing for the following products, including those specified in other Sections where glazing requirements are specified by reference to this Section:
 - 1. Window units.
 - 2. Vision lites.
 - 3. Entrances and other doors.
 - 4. Fixed glass, fire rated interior windows.

1.3 DEFINITIONS

- A. Manufacturer is used in this Section to refer to a firm that produces primary glass or fabricated glass as defined in the referenced glazing standard.

1.4 SUBMITTALS

- A. General: Submit the following according to Conditions of Contract and Division 1 Specification Sections.
- B. Product data for each glass product and glazing material indicated.
- C. Samples for verification purposes of 12-inch square samples of each type of glass indicated except for clear monolithic glass products, and 12-inch long samples of each color required (except black) for each type of sealant or gasket exposed to view. Install sealant or gasket sample between two strips of material representative in color of the adjoining framing system.
- D. Product certificates signed by glazing materials manufacturers certifying that their products comply with specified requirements.
 - 4. Separate certifications are not required for glazing materials bearing manufacturer's permanent labels designating type and thickness of glass, provided labels represent a quality control program of a recognized certification agency or independent testing agency acceptable to authorities having jurisdiction.

1.5 QUALITY ASSURANCE

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, except where more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
 - 4. FGMA Publications: "FGMA Glazing Manual."
- B. Safety Glass: Products complying with ANSI Z97.1 and testing requirements of 16 CFR Part 1201 for Category II materials.
 - 4. Subject to compliance with requirements, provide safety glass permanently marked with certification label of Safety Glazing Certification Council (SGCC) or other certification agency acceptable to authorities having jurisdiction.
- C. Fire-Resistive Glazing Products for Door Assemblies: Products identical to those tested per ASTM E 152, labeled and listed by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
- D. Fire-Resistive Glazing Products for Window Assemblies: Products identical to those tested per ASTM E 163, labeled and listed by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
- E. Glazier Qualifications: Engage an experienced glazier who has completed glazing similar in material, design, and extent to that indicated for Project with a record of successful in-service performance.
- F. Single-Source Responsibility for Glass: Obtain glass from one source for each product indicated below:
 - 4. Primary glass of each (ASTM C 1036) type and class indicated.
 - 5. Heat-treated glass of each (ASTM C 1048) condition indicated.
- G. Single-Source Responsibility for Glazing Accessories: Obtain glazing accessories from one source for each product and installation method indicated.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials to comply with manufacturer's directions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

1.7 PROJECT CONDITIONS

- A. Environmental Conditions: Do not proceed with glazing when ambient and substrate temperature conditions are outside the limits permitted by glazing materials

manufacturer or when glazing channel substrates are wet from rain, frost, condensation, or other causes.

PART 2 - PRODUCTS

2.1 PRIMARY FLOAT GLASS PRODUCTS

- A. Float Glass: ASTM C 1036, Type I (transparent glass, flat), and Quality q3 (glazing select).

2.2 HEAT-TREATED FLOAT GLASS

- A. Uncoated, Clear, Heat-Treated Float Glass: ASTM C 1048, Condition A (uncoated surfaces), Type I (transparent glass, flat), Class 1 (clear), Quality q3 (glazing select), kind as indicated below, 1/4" thick:

1. Kind FT (fully tempered) in the following locations:
 - a. Interior door vision panels in doors in non fire-rated openings.
 - b. Interior windows in non fire-rated openings.
2. Manufacturers: Subject to compliance with requirements, provide heat-treated glass by one of the following companies.
 - a. AFG Industries, Inc.
 - b. Ford Glass Division
 - c. Guardian Industries Corp.
 - d. HGP & Affiliates, Inc.
 - e. Pilkington LOF
 - f. PPG Industries, Inc.
 - g. Saint-Gobain
 - h. Viracon, Inc.

2.3 IMPACT-RESISTANT LAMINATED GLASS

- A. Kind LT (fully tempered), ASTM C 1172, in the following locations. Laminated glass must be consistent with entrance and window product manufacturers' NOA (Notice of Acceptance) documentation and conform to Missile Level E Enhanced Protection Requirements for Essential Facilities in accordance with ASTM E 1996.

1. Exterior storefront entrances:
 - a. Glass shall be 1/2" nominal, thick consisting of a 3/16" thick, fully tempered outer lite of Solexia green, and a 3/16" thick, fully tempered inner lite of clear glass. The plastic interlayer shall be the following:
 - 1) .090" Sentryglass Plus by DuPont

2. Exterior horizontal sliding windows:
 - a. Glass shall be ½" nominal, thick consisting of a 3/16" thick, fully tempered outer lite of Solexia green, and a 3/16" thick, fully tempered inner lite of clear glass. The plastic interlayer shall be the following:
 - 1) .090" Sentryglass Plus by DuPont

2.4 FIRE-PROTECTION-RATED CERAMIC GLAZING

- A. Fire-Protection-Rated Glazing, General: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9, including the hose stream test, and shall comply with NFPA 80.
 1. Install at all interior, fire rated doors and windows.
- B. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name; test standard; whether glazing is permitted to be used in doors or openings; if permitted in openings, whether or not glazing has passed the hose-stream test; whether or not glazing meets 450 deg F (250 deg C) temperature-rise limitation; and the fire-resistance rating in minutes.
- C. Laminated Ceramic glazing: Laminated glass made from 2 plies of clear, ceramic flat glass; 5/16-inch (8-mm) total nominal thickness; complying with testing requirements in 16 CFR 1201 for Category II materials, and certified as approved safety glazing.
 1. Subject to compliance with requirements, provide one of the following:
 - a. AGC Glass Company North America, Inc.
 - b. SAFTI-FIRST Fire Rated Glazing Solutions
 - c. Schott North America, Inc.; Laminated Pyran Crystal
 - d. Technical Glass Products
 - e. Vetrotech Saint-Gobain; SGG Keralite FR-L.

2.5 ELASTOMERIC GLAZING SEALANTS

- A. General: Provide products of type indicated, complying with the following requirements:
 1. Compatibility: Select glazing sealants and tapes of proven compatibility with other materials they will contact, including glass products, seals of insulating glass units, and glazing channel substrates, under conditions of installation and service, as demonstrated by testing and field experience.
 2. Suitability: Comply with sealant and glass manufacturer's recommendations for selecting glazing sealants and tapes that are suitable for applications indicated and conditions existing at time of installation.

3. Colors: Provide color of exposed joint sealants to comply with the following:
 - a. Provide selections made by Architect from manufacturer's full range of standard colors for products of type indicated.
- B. Elastomeric Glazing Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealants that comply with ASTM C 920 requirements.

2.6 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tape: Preformed, butyl-based elastomeric tape with a solids content of 100 percent, nonstaining and nonmigrating in contact with nonporous surfaces, with or without spacer rod as recommended by tape and glass manufacturers for application indicated, packaged on rolls with a release paper backing, and complying with AAMA 800.
- B. Expanded Cellular Glazing Tape: Closed-cell, polyvinyl chloride foam tape, factory coated with adhesive on both surfaces, packaged on rolls with release liner protecting adhesive, and complying with AAMA 800 for product 810.5.

2.7 GLAZING GASKETS

- A. Lock-Strip Gaskets: Neoprene extrusions in size and shape indicated, fabricated into frames with molded corner units and zipper lock strips, complying with ASTM C 542, black.
- B. Dense Compression Gaskets: Molded or extruded gaskets of material indicated below, complying with standards referenced with name of elastomer indicated below, and of profile and hardness required to maintain watertight seal:
 1. Neoprene, ASTM C 864.
 2. EPDM, ASTM C 864.
 3. Silicone, ASTM C 1115.
 4. Thermoplastic polyolefin rubber, ASTM C 1115.
 5. Any material indicated above.
- C. Soft Compression Gaskets: Extruded or molded closed-cell, integral-skinned gaskets of material indicated below, complying with ASTM C 509, Type II, black, and of profile and hardness required to maintain watertight seal:
 1. Neoprene.
 2. EPDM.
 3. Silicone.
 4. Thermoplastic polyolefin rubber.
 5. Any material indicated above.

2.8 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials involved for glazing application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers and Sealers: Type recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Elastomeric material with a Shore A durometer hardness of 85 plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions with a Shore A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side-walking).

2.9 FABRICATION OF GLASS AND OTHER GLAZING PRODUCTS

- A. Fabricate glass and other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with recommendations of product manufacturer and referenced glazing standard as required to comply with system performance requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine glass framing, with glazier present, for compliance with the following:
 - 1. Manufacturing and installation tolerances, including those for size, squareness, offsets at corners.
 - 2. Presence and functioning of weep system where required.
 - 3. Minimum required face or edge clearances.
 - 4. Effective sealing between joints of glass-framing members.
- B. Do not proceed with glazing until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings that are not firmly bonded to substrates.

3.3 GLAZING, GENERAL

- A. Comply with combined recommendations of manufacturers of glass, sealants, gaskets, and other glazing materials, except where more stringent requirements are indicated, including those in referenced glazing publications.
- B. Glazing channel dimensions as indicated on Drawings provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.
- C. Protect glass from edge damage during handling and installation as follows:
 - 1. Use a rolling block in rotating glass units to prevent damage to glass corners. Do not impact glass with metal framing. Use suction cups to shift glass units within openings; do not raise or drift glass with a pry bar. Rotate glass lites with flares or bevels on bottom horizontal edges so edges are located at top of opening, unless otherwise indicated by manufacturer's label.
 - 2. Remove damaged glass from Project site and legally dispose of off site. Damaged glass is glass with edge damage or other imperfections that, when installed, weaken glass and impair performance and appearance.
- D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.
- E. Install elastomeric setting blocks in sill rabbets, sized and located to comply with referenced glazing standard, 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 sizes larger than 50 united inches (length plus height) as follows:
 - 1. Locate spacers inside, outside, and directly opposite each other. Install correct size and spacing to preserve required face clearances, except where gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and comply with system performance requirements.
 - 2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- H. Provide edge blocking to comply with requirements of referenced glazing publications, unless otherwise required by glass manufacturer.
- I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- J. Square cut wedge-shaped gaskets at corners and install gaskets in manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 TAPE GLAZING

- A. Position tapes on fixed stops so that when compressed by glass their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously but not in one continuous length. Do not stretch tapes to make them fit opening.
- C. Where framing joints are vertical, cover these joints by applying tapes to heads and sills first and then to jambs. Where framing joints are horizontal, cover these joints by applying tapes to jambs and then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until just before each lite is installed.
- F. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

3.5 GASKET GLAZING (DRY)

- A. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with stretch allowance during installation.
- B. Secure compression gaskets in place with joints located at corners to compress gaskets producing a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- C. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

- A. Install continuous spacers between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel weep systems until sealants cure. Secure spacers 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. Install pressurized gaskets to protrude slightly out of channel to eliminate dirt and moisture pockets.

3.7 PROTECTION AND CLEANING

- A. Protect exterior glass from breakage 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 including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove them immediately as recommended 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 build-up of dirt, scum, alkali deposits, or stains, and remove as recommended by glass manufacturer.
- D. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in any way, including natural causes, accidents and vandalism, during construction period.
- E. Wash glass on both faces in each area of Project not more than 4 days prior to date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended by glass manufacturer.

END OF SECTION 088000

SECTION 089000 - LOUVERS AND VENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Fixed, extruded-aluminum intake and exhaust louvers at Apparatus Area 101.
- B. Related Sections include the following:
 - 1. Division 8 Section "Hollow Metal Doors and Frames" for louvers in hollow-metal doors.
 - 2. Division 8 Section "Flush Wood Doors" for louvers in wood doors.
 - 3. Division 23 Sections for louvers that are a part of HVAC equipment.

1.3 DEFINITIONS

- A. Louver Terminology: Definitions of terms for metal louvers contained in AMCA 501 apply to this Section unless otherwise defined in this Section or in referenced standards.
- B. Drainable-Blade Louver: Louver with blades having gutters that collect water and drain it to channels in jambs and mullions, which carry it to bottom of unit and away from opening.

1.4 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide louvers capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures shall be considered to act on vertical projection of louvers.
- B. Wind Loads: Provide louvers including anchorage to building capable of withstanding minimum allowable wind load design pressures as indicated. Note that these pressures have been calculated by multiplying the ultimate wind pressures by a factor of .6.

1. Positive pressure = +35.1 psf
 2. Negative pressure = -47.0 psf.
- C. Missile Impact Loads: Provide large and small hurricane missile protection in accordance with the Florida Building Code, Section 1626 – Impact Tests for Windborne Debris.
1. Impact-resistant louvers are indicated on drawings. Refer to Sheet Number A4.1
- D. Structural Design Criteria: Louvers shall pass Miami-Dade Protocols TAS-201 (Large Missile Impact), TAS-202 (Uniform Pressure), and TAS-203 (Cyclic Wind Pressure)

1.5 SUBMITTALS

- A. Product Data: For each type of product indicated
- B. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other Work. Show blade profiles, angles, and spacing.
1. For installed louvers and vents indicated to comply with design loads, include structural analysis data including anchorage to structure (fastener size, type, and spacing) signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Samples for Verification: For each type of metal finish required.
- D. Qualification Data: For professional engineer.
- E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency or by manufacturer and witnessed by a qualified testing agency, for each type of louver.
1. Provide State of Florida Product Approval number.

1.6 QUALITY ASSURANCE

- A. Source Limitations: Obtain louvers and vents through one source from a single manufacturer where indicated to be of same type, design, or factory-applied color finish.
- B. Welding: Qualify procedures and personnel according to the following:
1. AWS D1.2, "Structural Welding Code--Aluminum."
- C. SMACNA Standard: Comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" for fabrication, construction details, and installation procedures.

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify louver openings by field measurements before fabrication and indicate measurements on Shop Drawings.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabricating louvers without field measurements. Coordinate construction to ensure that actual opening dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements including masonry opening details indicated on drawings, provide products by one of the following:
 - 1. Louvers:
 - a. Airolite Company, LLC.
 - b. Industrial Louvers, Inc.
 - c. Ruskin Company; Tomkins PLC.

2.2 MATERIALS

- A. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy 6063-T5 or T-52.
- B. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy 3003 or 5005 with temper as required for forming, or as otherwise recommended by metal producer for required finish.
- C. Aluminum Castings: ASTM B 26/B 26M, alloy 319.
- D. Fasteners: Of same basic metal and alloy as fastened metal or 300 Series stainless steel, unless otherwise indicated. Do not use metals that are incompatible with joined materials.
 - 1. Use types and sizes to suit unit installation conditions.
 - 2. Use Phillips pan-head screws for exposed fasteners, unless otherwise indicated.
- E. Postinstalled Fasteners for Concrete and Masonry: Torque-controlled expansion anchors, made from stainless-steel components, with capability to sustain, without failure, a load equal to 4 times the loads imposed, for concrete, or 6 times the load imposed, for masonry, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
- F. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.3 FABRICATION, GENERAL

- A. Assemble louvers in factory to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- B. Maintain equal louver blade spacing to produce uniform appearance.
- C. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.
 - 1. Frame Type: Universal flange frame, unless otherwise indicated.
- D. Include supports, anchorages, and accessories required for complete assembly.
- E. Where indicated, provide subsills made of same material as louvers or extended sills for recessed louvers.
- F. Join frame members to each other and to fixed louver blades with fillet welds concealed from view, unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

2.4 FIXED, EXTRUDED-ALUMINUM LOUVERS

- A. Vertical, Wind-Driven Rain-Resistant, Missile-Resistant Louver:
 - 1. Products (for installation in exterior building walls only):
 - a. Ruskin Company Model EME6325D.
 - 2. Louver Depth: 6" overall assembly including missile protection system.
 - 3. Frame and Blade Nominal Thickness: As required to comply with structural performance requirements, but not less than 0.080 inch for blades and 0.080 inch for frames.
 - 4. Performance Requirements:
 - a. Percent Free Area: Not less than 42%, based upon actual louver size indicated on drawings.
 - b. Air Performance: Not more than 0.25 inch wg static pressure drop at 1,327 fpm free-area velocity.
 - c. Wind-Driven Rain Performance: Not less than 99.9 percent effectiveness when subjected to a rainfall rate of 3 inches per hour and a wind speed of 29 mph at a core-area intake velocity of 1006 fpm. Comply with Miami-Dade TAS-100A Wind-Driven Rain Test and AMCA 500L Wind-Driven Rain Test.
 - 5. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

- B. Horizontal, Florida Building Code Approved Drainable Louver
1. Products (for installation in A/C and Generator Enclosure screen wall only):
 - a. Airolite Company, LLC, Model K6746X
 - b. Industrial Louvers, Inc. Model 653XPDC
 - c. Ruskin Company Model ELF6375DFL
 2. Louver Depth: 6"
 - a. Provide extended sill accessory; screen not required.
 3. Frame and Blade Nominal Thickness: As required to comply with structural performance requirements, but not less than 0.080 inch for frames and blades.
 4. Performance Requirements
 - a. Percent Free Area: Not less than 54%.
 5. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

2.5 LOUVER SCREENS

- A. General: Provide screen at each exterior louver in building walls; not required at A/C and Generator Enclosure screen wall.
1. Screen Location for Fixed Louvers: Interior face.
 2. Screening Type: Insect screening.
- B. Secure screens to louver frames with stainless-steel machine screws, spaced a maximum of 6 inches from each corner and at 12 inches o.c.
- C. Louver Screen Frames: Fabricate with mitered corners to louver sizes indicated.
1. Metal: Same kind and form of metal as indicated for louver to which screens are attached. Reinforce extruded-aluminum screen frames at corners with clips.
 2. Finish: Same finish as louver frames to which louver screens are attached.
 3. Type: Rewirable frames with a driven spline or insert for securing screen mesh.
- D. Louver Screening for Aluminum Louvers:
1. Insect Screening: Fiberglass, 16x18 mesh (51% free area), 0.0048-inch wire.

2.6 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

- B. Finish louvers after assembly.

2.7 ALUMINUM FINISHES

- A. Finish designations prefixed by AA comply with system established by the Aluminum Association for designating aluminum finishes.
- B. High-Performance Organic-Coating Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 1. Fluoropolymer Two-Coat Coating System: Manufacturer's standard two-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2605.
 - a. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and openings, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

3.3 INSTALLATION

- A. Locate and place louvers and vents level, plumb, and at indicated alignment with adjacent work.
- B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
- C. Form closely fitted joints with exposed connections accurately located and secured.

- D. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.
- E. Repair finishes damaged by cutting, welding, soldering, and grinding. Restore finishes so no evidence remains of corrective work. Return items that cannot be refinished in the field to the factory, make required alterations, and refinish entire unit or provide new units.
- F. Protect galvanized and nonferrous-metal surfaces from corrosion or galvanic action by applying a heavy coating of bituminous paint on surfaces that will be in contact with concrete, masonry, or dissimilar metals.
- G. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weathertight louver joints are required. Comply with Division 7 Section "Joint Sealants" for sealants applied during louver installation.

3.4 ADJUSTING AND CLEANING

- A. Clean exposed surfaces of louvers and vents that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate until final cleaning.
- B. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.
- C. Restore louvers and vents damaged during installation and construction so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.
 - 1. Touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

END OF SECTION 089000

SECTION 092200 - PORTLAND CEMENT PLASTER

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Stucco skim-coat interior finish.

1.3 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product Data for each product specified.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver cementitious materials to Project site in original packages, containers, or bundles, labeled with manufacturer's name, product brand name, and lot number.
- B. Store materials inside, under cover, and dry, protected from weather, direct sunlight, surface contamination, aging, corrosion, and damage from construction traffic and other causes.

1.5 PROJECT CONDITIONS

- A. Environmental Requirements, General: Comply with requirements of referenced plaster application standards and recommendations of plaster manufacturer for environmental conditions before, during, and after plaster application.
- B. Warm-Weather Requirements: Protect plaster against uneven and excessive evaporation and from strong flows of dry air, both natural and artificial. Apply and cure plaster as required by climatic and job conditions to prevent dry out during cure period. Provide suitable coverings, moist curing, barriers to deflect sunlight and wind, or combinations of these, as required.

- C. Protect contiguous work from soiling and moisture deterioration caused by plastering. Provide temporary covering and other provisions necessary to minimize harmful spattering of plaster on other work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Stucco:
 - a. California Stucco Products Corp.
 - b. Florida Stucco Corp.
 - c. Highland Stucco.
 - d. IPA Systems, Inc.
 - e. United States Gypsum Co.

2.2 PLASTER MATERIALS

- A. Stucco Finish Coat: Manufacturer's standard factory-packaged stucco, including portland cement, aggregate, and other proprietary ingredients.

2.3 MISCELLANEOUS MATERIALS

- A. Water for Mixing and Finishing Plaster: Potable.
- B. Bonding Agent: ASTM C 932.

2.4 PLASTER MIXES AND COMPOSITIONS

- A. General: Comply with ASTM C 926 for finish-coat mixes as applicable to plaster bases, materials, and other requirements indicated.
- B. Job-Mixed Finish Coats: Proportion materials for finish coats in parts by volume for cementitious materials and parts by volume per sum of cementitious materials to comply with the following requirements:
 - 1. Proportions using sand aggregates as indicated below:
 - a. 1 part Portland cement, 3/4 to 1-1/2 parts lime, 3 parts sand; 1/8" thickness.
- C. Stucco Finish Coat: (May be used in lieu of above described job mixed finish coat). Add water only; comply with stucco manufacturer's written instructions; 1/8" thickness.

2.5 MIXING

- A. Mechanically mix cementitious and aggregate materials for plasters to comply with applicable referenced application standard and with recommendations of plaster manufacturer.

PART 3 - EXECUTION

3.1 PREPARATIONS FOR PLASTERING

- A. Clean plaster bases and substrates for direct application of plaster, removing loose material and substances that may impair the Work.
- B. Apply bonding agent on concrete and concrete unit masonry surfaces indicated for direct plaster application; comply with manufacturer's written instructions for application.

3.2 PLASTER APPLICATION

- A. Plaster Application Standard: Apply plaster materials, composition, and mixes to comply with ASTM C 926.
- B. Do not use materials that are caked, lumpy, dirty, or contaminated by foreign materials.
- C. Do not use excessive water in mixing and applying plaster materials.
- D. Flat Surface Tolerances: Do not deviate more than plus or minus 1/8 inch in 10 feet from a true plane in finished plaster surfaces, as measured by a 10-foot straightedge placed at any location on surface.
- E. Sequence plaster application with installation and protection of other work so that neither will be damaged by installation of other.
- F. Plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground, unless otherwise indicated. Where interior plaster is not terminated at metal frame by casing beads, cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.
- G. Corners: Make internal corners and angles square; finish external corners square and true with plaster faces on exterior work.
- H. Finish Coats: Apply finish coats to comply with the following requirements:
 - 1. Float Finish: Apply finish coat to a minimum thickness of 1/8 inch, uniformly floated to a true even plane with "sand float" finish.

2. Prepared Finish: Apply factory-prepared finish coats according to manufacturer's written instructions.

3.3 CUTTING AND PATCHING

- A. Cut, patch, replace, repair, and point up plaster as necessary to accommodate other work. Repair cracks and indented surfaces. Point-up finish plaster surfaces around items that are built into or penetrate plaster surfaces. Repair or replace work to eliminate blisters, buckles, check cracking, dry outs, efflorescence, excessive pinholes, and similar defects. Repair or replace work as necessary to comply with required visual effects.

3.4 CLEANING AND PROTECTING

- A. Remove temporary covering and other provisions made to minimize spattering of plaster on other work. Promptly remove plaster from door frames, windows, and other surfaces not to be plastered. Repair surfaces stained, marred or otherwise damaged during plastering work. When plastering work is completed, remove unused materials, containers, equipment, and plaster debris.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure plaster work is without damage or deterioration at the time of Substantial Completion.

END OF SECTION 092200

SECTION 092900 - GYPSUM BOARD ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Nonload-bearing steel framing members for gypsum board assemblies.
 - 2. Gypsum board assemblies attached to steel framing.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 7 Section "Firestop Systems" for firestopping systems and fire-resistance-rated joint sealants.
 - 2. Division 7 Section "Building Insulation" for sound attenuation insulation.

1.3 DEFINITIONS

- A. Gypsum Board Construction Terminology: Refer to ASTM C 11 and GA-505 for definitions of terms for gypsum board assemblies not defined in this Section or in other referenced standards.

1.4 ASSEMBLY PERFORMANCE REQUIREMENTS

- A. Sound Transmission Characteristics: For gypsum board assemblies with STC ratings, provide materials and construction identical to those of assemblies whose STC ratings were determined according to ASTM E 90 and classified according to ASTM E 413 by a qualified independent testing agency.
- B. Fire Resistance: Provide gypsum board assemblies with fire-resistance ratings indicated.

1.5 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product Data for each type of product specified.

1.6 QUALITY ASSURANCE

- A. Single-Source Responsibility for Steel Framing: Obtain steel framing members for gypsum board assemblies from a single manufacturer, unless otherwise indicated.
- B. Single-Source Responsibility for Panel Products: Obtain each type of gypsum board and other panel products from a single manufacturer.
- C. Single-Source Responsibility for Finishing Materials: Obtain finishing materials from either the same manufacturer that supplies gypsum board and other panel products or from a manufacturer acceptable to gypsum board manufacturer.
- D. Fire-Test-Response Characteristics: Where fire-resistance-rated gypsum board assemblies are indicated, provide gypsum board assemblies that comply with the following requirements:
 - 1. Fire-Resistance Ratings: As indicated by GA File Numbers in GA-600 "Fire Resistance Design Manual" or design designations in UL "Fire resistance Directory" or in the listing of another testing and inspecting agency acceptable to authorities having jurisdiction.
 - 2. Gypsum board assemblies indicated are identical to assemblies tested for fire resistance according to ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.
- B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Neatly stack gypsum panels flat to prevent sagging.

1.8 PROJECT CONDITIONS

- A. Environmental Conditions, General: Establish and maintain environmental conditions for applying and finishing gypsum board to comply with ASTM C 840 requirements or gypsum board manufacturer's recommendations, whichever are more stringent.
- B. Room Temperatures: For nonadhesive attachment of gypsum board to framing, maintain not less than 40 deg F. For adhesive attachment and finishing of gypsum board, maintain not less than 50 deg F for 48 hours before application and continuously after until dry. Do not exceed 95 deg F when using temporary heat sources.
- C. Ventilation: Ventilate building spaces as required to dry joint treatment materials. Avoid drafts during hot, dry weather to prevent finishing materials from drying too rapidly.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Steel Framing and Furring:
 - a. Clark Steel Framing, Inc.
 - b. Consolidated Systems, Inc.
 - c. Dale Industries, Inc.
 - d. Dietrich Industries, Inc.
 - e. Marino/Ware (formerly Marino Industries Corp.).
 - f. National Gypsum Co.; Gold Bond Building Products Division.
 - g. Unimast, Inc.
 2. Grid Suspension Assemblies:
 - a. Armstrong World Industries, Inc.
 - b. Chicago Metallic Corp.
 - c. USG Interiors, Inc.
 3. Gypsum Board and Related Products:
 - a. American Gypsum Co.
 - b. Georgia-Pacific Corp.
 - c. National Gypsum Co.; Gold Bond Building Products Division.
 - d. United States Gypsum Co.

2.2 STEEL FRAMING COMPONENTS FOR SUSPENDED AND FURRED CEILINGS

- A. General: Provide components complying with ASTM C 754 for conditions indicated.
- B. Grid Suspension System for Interior Ceilings: ASTM C 645, manufacturer's standard direct-hung grid suspension system composed of main beams and cross-furring members that interlock to form a modular supporting network.

2.3 STEEL FRAMING FOR WALLS AND PARTITIONS

- A. General: Provide steel framing members complying with the following requirements:
1. Protective Coating: ASTM A 653, G 40 hot-dip galvanized coating.
- B. Steel Studs and Runners: ASTM C 645, with flange edges of studs bent back 90 degrees and doubled over to form 3/16-inch- wide minimum lip (return), and complying with the following requirements for minimum thickness of base (uncoated) metal and for depth:

1. Thickness: 0.0179 inch (25 gage) unless otherwise indicated.
 2. Thickness: 0.0329 inch, (20 gauge) as follows:
 - a. For head runner, sill runner, jamb, and cripple studs at door and other openings.
 - b. At partitions all around shower stalls.
 3. Depth: 3 5/8" unless otherwise indicated on drawings.
- C. Fasteners for Metal Framing: Provide fasteners of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel framing and furring members securely to substrates involved; complying with the recommendations of gypsum board manufacturers for applications indicated.

2.4 GYPSUM BOARD PRODUCTS

- A. General: Provide gypsum board of types indicated in maximum lengths available that will minimize end-to-end butt joints in each area indicated to receive gypsum board application.
1. Widths: Provide gypsum board in widths of 48 inches.
- B. Gypsum Wallboard: ASTM C 1396 and as follows:
1. Type: Type X where required for fire-resistance-rated assemblies.
 2. Edges: Tapered.
 3. Thickness: 5/8 inch typical, unless otherwise indicated on drawings.
 4. Type: Sag-resistant for ceiling surfaces ("ceiling board") 1/2" thick.
- C. Glass-Mat, Water-Resistant Gypsum Tile Backing Board: ASTM C 1178, of type and thickness indicated below for installation at shower stalls:
1. Type and Thickness: Regular, 5/8 inch thick, unless otherwise indicated.
 2. Products: Subject to compliance with requirements, provide "Dens-Shield Tile Backer" manufactured by G-P Gypsum Corp.
- D. Paperless Drywall Panels: ASTM C 1396 and ASTM C 1177/C, for installation in Toilet Rooms only, except behind tile at shower stalls:
1. Type and thickness: Regular, 5/8" thick with moisture and mold resistant core and surfaces.
 2. Facing: Coated, glass mat.
 3. Product: Subject to compliance with requirements, provide "DensArmor Plus Paperless Interior Panel" panels manufactured by G-P Gypsum Corp.

2.5 TRIM ACCESSORIES

- A. Accessories for Interior Installation: Cornerbead, edge trim, and control joints complying with ASTM C 1047 and requirements indicated below:

1. Material: Formed metal complying with the following requirement:
 - a. Steel sheet zinc coated by hot-dip process or rolled zinc.
 2. Shapes indicated below by reference to Fig. 1 designations in ASTM C 1047:
 - a. Cornerbead on outside corners, unless otherwise indicated.
 - b. J-bead with both face and back flanges; face flange formed to receive joint compound. Use J-beads for edge trim, unless otherwise indicated.
 - c. One-piece control joint formed with V-shaped slot and removable strip covering slot opening.
- B. Accessory for Curved Edges: Cornerbead formed of metal with either notched or flexible flanges that are bendable to curvature radius.

2.6 JOINT TREATMENT MATERIALS

- A. General: Provide joint treatment materials complying with ASTM C 475 and the recommendations of both the manufacturers of sheet products and of joint treatment materials for each application indicated.
- B. Joint Tape for Gypsum Board: Paper reinforcing tape, unless otherwise indicated.
- C. Joint Tape for Glass Mat, Water-Resistant Gypsum Backer Units and Paperless Drywall: 2" 10 x 10 glass mesh tape embedded in setting compound recommended by panel manufacturer.
- D. Drying-Type Joint Compounds for Gypsum Board: Factory-packaged vinyl-based products complying with the following requirements for formulation and intended use.
 1. Ready-Mixed Formulation: Factory-mixed product.
 - a. All-purpose compound formulated for both taping and topping compounds.

2.7 ACOUSTICAL SEALANT

- A. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 and the following requirements:
 1. Product is effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
- B. Acoustical Sealant for Exposed and Concealed Joints:
 - a. PL Acoustical Sealant; ChemRex, Inc.; Contech Brands.
 - b. AC-20 FTR Acoustical and Insulation Sealant; Pecora Corp.
 - c. SHEETROCK Acoustical Sealant; United States Gypsum Co.

2.8 MISCELLANEOUS MATERIALS

- A. General: Provide auxiliary materials for gypsum board construction that comply with referenced standards and recommendations of gypsum board manufacturer.
- B. Spot Grout: ASTM C 475, setting-type joint compound recommended for spot-grouting hollow metal door frames.
- C. Steel drill screws complying with ASTM C 954 for fastening gypsum board to steel members from 0.033 to 0.112 inch thick.
- D. Ready-Mixed Texture Compound: Type required for spray application of orange peel texture to all gypsum board walls.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates to which gypsum board assemblies attach or abut, installed hollow metal frames, cast-in-anchors, and structural framing, with installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of assemblies specified in this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Ceiling Anchorages: Coordinate installation of ceiling suspension systems with installation of overhead structural assemblies to ensure that inserts and other provisions for anchorages to building structure have been installed to receive ceiling hangers that will develop their full strength and at spacing required to support ceilings.

3.3 INSTALLING STEEL FRAMING, GENERAL

- A. Steel Framing Installation Standard: Install steel framing to comply with ASTM C 754 and with ASTM C 840 requirements that apply to framing installation.
- B. Install supplementary framing, blocking, and bracing at terminations in gypsum board assemblies to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, door bumpers, furnishings, or similar construction. Comply with details indicated and with recommendations of gypsum board manufacturer or, if none available, with United States Gypsum Co.'s "Gypsum Construction Handbook."

3.4 INSTALLING STEEL FRAMING FOR SUSPENDED AND FURRED CEILINGS

- A. Suspend ceiling hangers from building structural members and 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 ceiling suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with the location of hangers required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
 3. Secure wire hangers by looping and wire-typing, either directly to structures or to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for structure as well as for type of hanger involved, and in a manner that will not cause them to deteriorate or otherwise fail.
 4. Secure flat, angle, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for structure as well as for type of hanger involved, and in a manner that will not cause them to deteriorate or otherwise fail.
 5. Do not support ceilings directly from permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
 6. Do not attach hangers to steel deck tabs.
 7. Do not attach hangers to steel roof deck. Attach hangers to structural members.
 8. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- B. Install suspended steel framing components in sizes and at spacings indicated, but not less than that required by the referenced steel framing installation standard.
1. Wire Hangers: 48 inches o.c.
 2. Main Tees: 48 inches o.c.
 3. Cross Channels 24 inches o.c.
 4. Cross Tees: As required for installation of recessed fluorescent light fixtures.
- C. Installation Tolerances: Install steel framing components for suspended ceilings so that grid suspension members are level to within 1/8 inch in 12 feet as measured both lengthwise on each member and transversely between parallel members.
- D. Grid Suspension System: Attach perimeter wall track or angle where grid suspension system meets vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.
- 3.5 INSTALLING STEEL FRAMING FOR WALLS AND PARTITIONS
- A. Install runners (tracks) at floors, ceilings, and structural walls and columns where gypsum board stud assemblies abut other construction.
1. Where studs are installed directly against exterior walls, install asphalt felt strips or foam gaskets between studs and wall.

- B. Installation Tolerances: Install each steel framing and furring member so that fastening surfaces do not vary more than 1/8 inch from the plane formed by the faces of adjacent framing.
- C. Extend partition framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing over frames for doors and openings and frame around ducts penetrating partitions above ceiling to provide support for gypsum board.
 - 1. For STC-rated and fire-resistance-rated partitions that extend to the underside of floor/roof slabs and decks or other continuous solid structural surfaces to obtain ratings, install framing around structural and other members extending below floor/roof slabs and decks, as needed, to support gypsum board closures needed to make partitions continuous from floor to underside of solid structure.
- D. Terminate partition framing at suspended ceilings where indicated.
- E. Install steel studs and furring in sizes and at spacings indicated.
 - 1. Single-Layer Construction: Space studs 16 inches o.c., unless otherwise indicated.

3.6 APPLYING AND FINISHING GYPSUM BOARD, GENERAL

- A. Gypsum Board Application and Finishing Standards: Install and finish gypsum panels to comply with ASTM C 840 and GA-216.
- B. Install sound-attenuation blankets, where indicated, prior to installing gypsum panels unless blankets are readily installed after panels have been installed on one side.
- C. Install ceiling board panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in the central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- D. Install gypsum panels with face side out. Do not install imperfect, damaged, or damp panels. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
- E. Locate both edge or end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Avoid joints other than control joints at corners of framed openings where possible.
- F. Attach gypsum panels to steel studs so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- G. Attach gypsum panels to framing provided at openings and cutouts.

- H. Form control and expansion joints at locations indicated and as detailed, with space between edges of adjoining gypsum panels, as well as supporting framing behind gypsum panels.
- I. Cover both faces of steel stud partition framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases that are braced internally.
 - 1. Except where concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
 - 2. Fit gypsum panels around ducts, pipes, and conduits.
 - 3. Where partitions intersect open concrete coffers, concrete joists, and other structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by coffers, joists, and other structural members; allow 1/4 - to 3/8-inch wide joints to install sealant.
- J. Isolate perimeter of nonload-bearing gypsum board partitions at structural abutments, except floors, as detailed. Provide 1/4- to 1/2-inch wide spaces at these locations and trim edges with U-bead edge trim where edges of gypsum panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- K. Where STC-rated gypsum board assemblies are indicated, seal construction at perimeters, behind control and expansion joints, openings, and penetrations with a continuous bead of acoustical sealant including a bead at both faces of the partitions. Comply with ASTM C 919 and manufacturer's recommendations for location of edge trim and closing off sound-flanking paths around or through gypsum board assemblies, including sealing partitions above acoustical ceilings.
 - 1. Sealing of penetrations in sound walls which are identified as also being fire-rated or smoke-resistant is the work of Section 07840. Fire and smoke requirements take precedence.
- L. Space fasteners in gypsum panels according to referenced gypsum board application and finishing standard and manufacturer's recommendations.
 - 1. Space screws a maximum of 12 inches o.c. for vertical applications.
- M. Space fasteners in panels that are tile substrates a maximum of 8 inches o.c.
- N. Sealing of perimeters of and penetrations through fire-rated or smoke-resistant assemblies is the work of Section 07840.
- O. Identify rated walls above ceilings with the note "fire and smoke barrier-protect all openings", complying with requirements of local jurisdictions.

3.7 GYPSUM BOARD APPLICATION METHODS

- A. Single-Layer Application: Install gypsum wallboard panels as follows:

1. On ceilings, apply gypsum panels prior to wall/partition board application to the greatest extent possible and at right angles of framing, unless otherwise indicated.
 2. On partitions/walls, apply gypsum panels vertically (parallel to framing), unless otherwise indicated, and provide panel lengths that will minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of board.
- B. Wall Tile Substrates: For substrates indicated to receive ceramic tile, comply with the following:
1. Install glass-mat, water resistant gypsum backing board panels to comply with manufacturer's installation instructions at showers. Install with $\frac{1}{4}$ -inch open space where panels abut other construction or penetrations. Fill gap with elastomeric sealant.
- C. Single-Layer Fastening Methods: Apply gypsum panels to supports as follows:
1. Fasten with screws.

3.8 INSTALLING TRIM ACCESSORIES

- A. General: For trim accessories with back flanges, fasten to framing with the same fasteners used to fasten gypsum board. Otherwise, fasten trim accessories according to accessory manufacturer's directions for type, length, and spacing of fasteners.
- B. Install cornerbead at external corners.
- C. Install edge trim where edge of gypsum panels would otherwise be exposed. Provide edge trim type with face flange formed to receive joint compound, except where other types are indicated.
1. Install LC-bead where gypsum panels are tightly abutted to other construction and back flange can be attached to framing or supporting substrate.
 2. Install aluminum trim and other accessories where indicated.
- D. Install control joints according to ASTM C 840 and manufacturer's recommendations and in specific locations approved by architect for visual effect.

3.9 FINISHING GYPSUM BOARD ASSEMBLIES

- A. General: Treat gypsum board joints, interior angles, flanges of cornerbead, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration.
- B. Prefill open joints, rounded or beveled edges, and damaged areas using setting-type joint compound.

- C. Apply joint tape over gypsum board joints and to flanges of trim accessories as recommended by trim accessory manufacturer.
- D. Levels of Gypsum Board Finish: Provide the following levels of gypsum board finish per GA-214.
 - 1. Level 1 for ceiling plenum areas, concealed areas, and where indicated, unless a higher level of finish is required for fire-resistance-rated assemblies and sound-rated assemblies.
 - 2. Level 2 where panels form substrates for tile and where indicated.
 - 3. Level 4 for gypsum board surfaces, unless otherwise indicated.
- E. Use one of the following joint compound combinations as applicable to the finish levels specified:
 - 1. Embedding and First Coat: Ready-mixed drying-type, all purpose or taping compound. Fill (second) Coat: Ready-mixed, drying-type, all-purpose or topping compound. Finish (third) Coat: Ready-mixed, drying-type, all-purpose or topping compound.
- F. For Level 4 gypsum board finish, embed tape in joint compound and apply first, fill (second), and finish (third) coats of joint compound over joints, angles, fastener heads, and accessories. Touch up and sand between coats and after last coat as needed to produce a surface free of visual defects and ready for decoration.
- G. Where Level 2 gypsum board finish is indicated, embed tape in joint compound and apply first coat of joint compound.
- H. Where Level 1 gypsum board finish is indicated, embed tape in joint compound.

3.10 APPLYING TEXTURE FINISHES TO WALLS

- A. Surface Preparation and Primer: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes. Apply primer to surfaces that are clean, dry, and smooth.
- B. Texture Finish Application: Mix and apply finish using powered spray equipment, to produce a uniform texture free of starved spots or other evidence of thin application or of application patterns.
- C. Prevent texture finishes from coming into contact with surfaces not indicated to receive texture finish by covering them with masking agents, polyethylene film, or other means. If, despite these precautions, texture finishes contact these surfaces, immediately remove droppings and overspray to prevent damage according to texture finish manufacturer's written recommendations.

3.11 FIELD QUALITY CONTROL

- A. Above-Ceiling Observation: Architect will conduct an above-ceiling observation prior to installation of gypsum board ceilings and soffits and report any deficiencies in the work observed. Do not proceed with installation of gypsum board to ceiling or soffit support framing until deficiencies have been corrected.
 - 1. Notify architect one week in advance of the date and the time when the project, or part of the project, will be ready for an above-ceiling observation.
 - 2. Prior to notifying architect, complete the following in areas to receive gypsum board ceilings:
 - a. Installation of 80 percent of lighting fixtures, powered for operation.
 - b. Installation, insulation, and leak and pressure testing of water piping systems.
 - c. Installation of air duct systems.
 - d. Installation of air devices.
 - e. Installation of mechanical system control air tubing.
 - f. Installation of ceiling support framing.

3.2 CLEANING AND PROTECTION

- A. Promptly remove any residual joint compound from adjacent surfaces.
- B. Provide final protection and maintain conditions, in a manner acceptable to Installer, that ensure gypsum board assemblies are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 092900

SECTION 093000 – CERAMIC TILE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Porcelain paver tile.
 - 2. Unglazed ceramic mosaic tile.
 - 3. Glazed wall tile.
 - 4. Marble thresholds and window sills.
 - 5. Crack suppression membrane.
 - 6. Grout sealer.

1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product data for each type of product specified.
- C. Samples for initial selection purposes in form of manufacturer's color charts consisting of actual tiles or sections of tile showing full range of colors, textures, and patterns available for each type and composition of tile indicated. Include samples of grout and accessories involving color selection.
- D. Samples for verification purposes of each item listed below, prepared on samples of size and construction indicated. Where products involve normal color and texture variations, include sample sets showing the full range of variations expected.
 - 1. Each type and composition of tile and for each color and texture required, at least 12 inches square, mounted on plywood or hardboard backing and grouted.
 - 2. Full-size units of each type of trim and accessory for each color required.

1.4 QUALITY ASSURANCE

- A. Single-Source Responsibility for Tile: Obtain each color, grade, finish, type, composition, and variety of tile from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.

- B. Single-Source Responsibility for Setting and Grouting Materials: Obtain ingredients of a uniform quality from one manufacturer for each cementitious and admixture component and from one source or producer for each aggregate.
- C. Installer Qualifications: Engage an experienced Installer who has successfully completed tile installations similar in material, design, and extent to that indicated for Project.
- D. Preinstallation Conference: Conduct conference at project site with tile subcontractor.
 - 1. Review requirements in ANSI A108.01 for substrates and for preparation by other trades.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirement of ANSI A137.1 for labeling sealed tile packages.
- B. Prevent damage or contamination to materials by water, freezing, foreign matter, and other causes.

1.6 PROJECT CONDITIONS

- A. Maintain environmental conditions and protect work during and after installation to comply with referenced standards and manufacturer's printed recommendations.

1.7 EXTRA MATERIALS

- A. Deliver extra materials to Owner. Furnish extra materials that match products installed as described below, packaged with protective covering for storage and identified with labels clearly describing contents.
 - 1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed, for each type, composition, color, pattern, and size.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Porcelain Paver Tile:
 - a. Ceramiche Caesar.
 - b. Crossville Ceramics.

- c. Daltile.
 - d. Stonepeak.
- 2. Unglazed Ceramic Mosaic Tile:
 - a. American Olean Tile Co., Inc.
 - b. Daltile Corp.
 - c. United States Ceramic Tile Co.
- 3. Glazed Wall Tile; 12" x 12":
 - a. American Olean Tile Co., Inc.
 - b. Dal-Tile Corp.
 - c. United States Ceramic Tile Co.
- 4. Glazed Wall Tile with Stone Look and Random Shade Variation:
 - a. American Olean Tile Co., Inc.
 - b. Dal-Tile Corp.
 - c. United States Ceramic Tile Co.
- 5. Latex-Emulsion-Based Latex-Portland Cement Mortars:
 - a. Bonsal
 - b. Bostik Construction Products Div.
 - c. Custom Building Products
 - d. Laticrete International Inc.
 - e. Mapei Corp.
- 6. Commercial Portland Cement Grouts:
 - a. Bonsal
 - b. Bostik Construction Products Div.
 - c. Custom Building Products
- 7. Acrylic Emulsions for Latex-Portland Cement Grouts:
 - a. Bonsal
 - b. Bostik Construction Products Div.
 - c. Custom Building Products
 - d. Laticrete International Inc.
 - e. Mapei Corp.
- 8. Crack Suppression Membranes:
 - a. Schluter Systems L.P.
 - b. National Applied Construction Products, Inc.
 - c. Mapei
 - d. Laticrete

9. Grout Sealer:

- a. Stone Tech Professional, Inc.
- b. Aquamix
- c. CeramaSeal
- d. Mapei

2.2 PRODUCTS, GENERAL

- A. ANSI Standard for Ceramic Tile: Comply with ANSI A137.1 "American National Standard Specifications for Ceramic Tile" for types, compositions, and grades of tile indicated.
 1. Furnish tile complying with "Standard Grade" requirements unless otherwise indicated.
- B. ANSI Standard for Tile Installation Materials: Comply with ANSI standard referenced with products and materials indicated for setting and grouting.
- C. Colors, Textures, and Patterns: Where manufacturer's standard products are indicated for tile, grout, and other products requiring selection of colors, surface textures, patterns, and other appearance characteristics, provide specific products or materials complying with the following requirements:
 1. Provide selections made by Architect from Manufacturer's standard color ranges as follows:
 - a. Porcelain Paver Tile: Any color in price groups 1 or 2, similar to Daltille "Porcealto".
 - b. Unglazed Ceramic Mosaic Tile: Any color in price groups 1 or 2, similar to American Olean "Colorbody Porcelain Mosaics".
 - c. Glazed Wall Tile: Any color similar to American Olean "Trey mont Series".
 - d. Glazed Wall Tile, Stone Look, Random Shading: Any standard color, similar to American Olean "Costa Rei".
 2. Provide tile trim and accessories that match color and finish of adjoining flat tile.
- D. Factory Blending: For tile exhibiting color variations within the ranges selected during sample submittals, blend tile in factory and package accordingly so that tile units taken from one package show the same range in colors as those taken from other packages and match approved samples.
- E. Mounting: Where factory-mounted tile is required, provide back- or edge-mounted tile assemblies as standard with manufacturer unless another mounting method is indicated.

2.3 TILE PRODUCTS

- A. Porcelain Paver Tile: Provide flat tile complying with the following requirements:

1. Composition: Porcelain, unglazed.
 2. Nominal Facial Dimensions: 18 inches by 18 inches.
 3. Nominal Thickness: 3/8 inch.
 4. Face: Plain with square edges.
 5. Finish: Unpolished.
- B. Unglazed Ceramic Mosaic Tile: Provide factory-mounted flat tile complying with the following requirements:
1. Composition: Porcelain.
 2. Nominal Facial Dimensions: 2 inches by 2 inches.
 3. Nominal Thickness: 1/4 inch.
 4. Face: Plain with cushion edges.
- C. Glazed Wall Tile: Provide flat tile complying with the following requirements:
1. Composition: Porcelain, glazed.
 2. Nominal Facial Dimensions: 12 inches by 12 inches at all shower stalls.
 3. Nominal Thickness: 5/16 inch.
 4. Face: Plain with modified square edge or cushion edge.
- D. Glazed Wall Tile: Stone Look, Random Shading: Provide flat tile complying with the following requirements:
1. Nominal Facial Dimensions: 6 inches by 6 inches.
 2. Nominal Thickness: 5/16 inch.
 3. Face: Plain with square edge.
 4. Installation: Install on the diagonal above kitchen countertops.
- E. Trim Units: Provide tile trim units to match characteristics of adjoining flat tile and to comply with following requirements:
1. Size: As indicated, coordinated with sizes and coursing of adjoining flat tile where applicable.
 2. Glazed Wall Tile at Showers: 3 inch x 12 inch surface bullnose cap.
 3. Glazed Wall Tile Base at Toilet/Shower Rooms: 3 inch x 12 inch surface bullnose with field mitered inside and outside corners.
 4. Stone-Look Glazed Wall Tile: 3 inch x 12 inch surface bullnose above kitchen countertops.
 5. Porcelain Paver Tile: 4 inch x 12 inch surface bullnose base with field-mitered inside and outside corners.

2.4 STONE THRESHOLDS

- A. General: Provide stone that is uniform in color and finish, fabricated to sizes and profiles indicated or required to provide transition between tile surfaces and adjoining finished floor surfaces.

- B. Marble Thresholds: Provide marble thresholds complying with ASTM C 503 requirements for exterior use and for abrasion resistance where exposed to foot traffic, a minimum hardness of 10 per ASTM C 241.
 - 1. Provide white, honed marble complying with MIA Group "A" requirements for soundness.
- C. Window Sills: White marble, minimum 1/2" thick.

2.5 SETTING MATERIALS

- A. Thin Set Latex Portland Cement Mortar Installation Materials: Provide materials complying with ANSI A118.4 and as specified below.
 - 1. Mixture of Dry-Mortar Mix and Latex Additive: Factory-mixed formulation of mix and additive.
- B. Portland Cement Mortar Installation Materials: Provide materials complying with ANSI A108.1A.
- C. Wall Base Adhesive: Construction adhesive for securing tile base to gypsum board (except at showers). Do not use thin set mortar for securing porcelain paver tile base to walls.
 - 1. Product: Liquid Nails Ceramic Wall and Floor Tile Adhesive.

2.6 GROUTING MATERIALS

- A. Polymer Modified Sanded Tile Grout: ANSI A118.7, color as selected by Architect from manufacturer's full range.
 - 1. Latex additive (water emulsion) serving as replacement for part or all of gauging water, added at job site with dry grout mixture, with type of latex and dry grout mix as follows:
 - a. Latex Type: Manufacturer's standard.
 - b. Dry Grout Mixture: Dry-set sanded grout specified or supplied by latex additive manufacturer. Use latex additive without retarder with dry-set grout.

2.7 CRACK SUPPRESSION MEMBRANE

- A. Flexible "Peel-and-Stick" Sheet: Provide a highly flexible elastomeric, self-bonding, pressure-sensitive sheet membrane system for crack isolation that is compatible with latex-modified thinset mortars. Provide one of the following:
 - 1. Mapelastic SM, Mapei
 - 2. ECB Membrane, National Applied Construction Products, Inc.
 - 3. Schluter – KERDI, Schluter Systems

2.8 GROUT SEALER

- A. Grout Sealer: Water-based liquid sealer that resists water, oil, and acid-based contaminants. Provide one of the following:
1. All Purpose Grout Sealer, StoneTech Professional, Inc.
 2. Grout & Tile Sealer, CeramaSeal
 3. Keraseal Tile and Grout Sealer, Mapei
 4. Grout Sealer, Aqua Mix

2.9 GROUT RELEASE

- A. Temporary Protective Coating: Product indicated below that is formulated to protect exposed surfaces of tile against adherence of mortar and grout; compatible with tile, mortar, and grout products; and easily removable after grouting is completed without damaging grout or tile.
1. Grout release in form of manufacturer's standard proprietary liquid coating that is specially formulated and recommended for use as temporary protective coating for tile. Provide one of the following:
 - a. "Grout Release," Aqua Mix.
 - b. "SL-90 Summit Shield Grout Release," Summitville.
 - c. "Grout Easy," Aldon.
 - d. "Super Grout Release," Klein and Company, Inc.

2.10 WATERPROOFING FOR TILE SHOWER RECEPTORS

- A. Polyethylene Sheet Waterproofing: Manufacturer's standard proprietary product consisting of composite sheets, 60 inches wide by a nominal thickness of 0.040 inches, composed of an inner layer of chlorinated polyethylene sheet faced on both sides with laminated high-strength nonwoven polyester material, designed for embedding in latex-Portland cement mortar, and as the substrate for latex-Portland cement mortar setting bed.
- B. PVC-Sheet Waterproofing: Manufacturer's standard proprietary product consisting of composite sheets, 60 inches of PVC sheet heat-fused together and to facings of bondable nonwoven polyester, designed for embedding in latex-Portland cement mortar and as the substrate for latex-Portland cement mortar setting bed.
- C. Products: Subject to compliance with requirements, provide one of the following:
1. Polyethylene Sheet Waterproofing:
 - a. "Chloraloy"; Noble Co.
 2. PVC Sheet Waterproofing:

- a. "Composeal Blue"; Compotite Corp.

2.11 MISCELLANEOUS MATERIALS

- A. Temporary Protective Coating for Porcelain Paver Tile: Provide product indicated below that is formulated to protect exposed surfaces of tile against adherence of mortar and grout; is compatible with tile, mortar, and grout products; and is easily removable after grouting is completed without damaging grout or tile.
 - 1. Grout release in form of manufacturer's standard proprietary liquid coating that is specially formulated and recommended for use as a temporary protective coating for tile.

2.12 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with requirements of referenced standards and manufacturers including those for accurate proportioning of materials, water, or additive content; type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other procedures needed to produce mortars and grouts of uniform quality with optimum performance characteristics for application indicated.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Examine substrates and areas 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, and free from oil or waxy films and curing compounds.
 - 2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.
- B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Blending: For tile exhibiting color variations within the ranges selected during sample submittals, verify that tile has been blended in factory and packaged accordingly so that units taken from one package show the same range in colors as those taken from other packages and match approved samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 INSTALLATION, GENERAL

- A. ANSI Tile Installation Standard: Comply with parts of ANSI 108 series of tile installation standards included under "American National Standard Specifications for the Installation of Ceramic Tile" that apply to type of setting and grouting materials and methods indicated.
- B. TCA Installation Guidelines: TCA "Handbook for Ceramic Tile Installation"; comply with TCA installation methods indicated.
- C. Extend tile work into recesses and under or behind equipment and fixtures to form a complete covering without interruptions except as otherwise shown. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- D. 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 that plates, collars, or covers overlap tile.
 - 1. Porcelain paver wall base shall be mitered at inside and outside corners. Ease cut edges at miters.
- E. Jointing Pattern: Unless otherwise shown, lay tile in grid pattern. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths unless otherwise shown.
 - 1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so that extent of each sheet is not apparent in finished work.
- F. Expansion Joints: Locate expansion joints as noted on architectural and/or structural drawings and field verify.
 - 1. Provide sealant-filled joints in tile directly above expansion joints in slabs. Use 1 or 2 part pourable polyurethane sealant for Use T in color selected by architect. Follow Tile Council of America Handbook for Ceramic Tile Installation details.
 - 2. Tile expansion joints are not required at concrete slab control joints which are to receive crack suppression membrane.
- G. Grout tile to comply with the requirements of the following installation standards:
 - 1. For ceramic tile grouts (sand-Portland cement, dry-set, commercial Portland cement, and latex-Portland cement grouts), comply with ANSI A108.10.
 - 2. Apply grout release when installing porcelain paver tile.
- H. Seal all grout joints with grout sealer applied in accordance with manufacturer's directions. Grout sealer must be applied by the tile subcontractor.

3.4 FLOOR INSTALLATION METHODS

- A. Ceramic Mosaic Tile at Shower Receptors: Install tile to comply with requirements indicated below for setting bed methods, TCA installation methods related to types of subfloor construction, and grout types:
1. Bond Coat: Portland cement paste or dust coat on plastic bed, or the following thin-set mortar on cured bed, ANSI A108.5, at Contractor's option:
 - a. Latex – Portland Cement Mortar.
 2. Grout: Dry-set sanded grout with latex additive: Installation Specification – ANSI A108.10. Grout Joint: 1/8 inch.
 3. TCA Installation Method B420 for glass mat tile backer board.
- B. Porcelain Paver Tile for Thin Set Installation Over Concrete Slabs: Install tile to comply with requirements indicated below for setting bed methods, TCA installation method and grout types:
1. Latex – Portland Cement Mortar: Installation Specification – ANSI A108.5.
 2. Grout: Dry-set sanded grout with latex additive: Installation specification – ANSI A108.10. Grout Joint: 3/16 inch.
 3. TCA Installation Method F113.
 4. Secure porcelain paver tile base to drywall partitions using construction adhesive applied in accordance with manufacturer's instructions using V-type trowel with notches 3/16" deep.

3.5 WALL TILE INSTALLATION METHODS

- A. Install types of tile designated for wall application to comply with requirements indicated below for setting-bed methods, TCA installation methods related to subsurface wall conditions, and grout types:
1. Thin-set latex-Portland Cement Mortar: Installation Specification-ANSI A108.5.
 2. Grout: Dry-set, sanded with latex additive: Installation Specification-ANSI A108.10. Grout Joint: 3/16 inch.
 3. TCA Installation Method B420 for glass mat tile backer board. Install sanitary cove base flush with floor tile – do not set base on top of floor tile.
 4. Secure tile base to drywall partitions using construction adhesive applied in accordance with manufacturer's instructions using V-type trowel with notches 3/16" deep.

3.6 CLEANING AND PROTECTION

- A. Cleaning: Upon completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
1. Remove latex-Portland cement grout residue from tile as soon as possible.
 2. Unglazed tile may be cleaned with acid solutions only when permitted by tile and grout manufacturer's printed instructions, but no sooner than 14 days after

- installation. Protect metal surfaces, cast iron, and vitreous plumbing fixtures from effects of acid cleaning. Flush surface with clean water before and after cleaning.
3. Remove temporary protective coating by method recommended by coating manufacturer that is acceptable to tile and grout manufacturer.
- B. Finished Tile Work: Leave finished installation clean and free of cracked, chipped, broken, unbonded, and otherwise defective tile work.
- C. Provide final protection and maintain conditions in a manner acceptable to manufacturer and installer that ensure that tile is without damage or deterioration at time of Substantial Completion.
1. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear.
 2. Prohibit foot and wheel traffic from tiled floors for at least 7 days after grouting is completed.
- D. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

END OF SECTION 093000

SECTION 095113 - ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes ceilings composed of acoustical panels and exposed suspension systems.

1.3 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract.
- B. Product data for each type of product specified.
- C. Samples for initial selection in the form of manufacturer's color charts consisting of actual acoustical panels or sections of panels and sections of suspension system members showing the full range of colors, textures, and patterns available for each ceiling assembly indicated.
- D. Samples for verification of each type of exposed finish required, prepared on samples of size indicated below. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
 - 1. 6-inch square samples of each acoustical panel type, pattern, and color.
 - 2. Set of 12-inch long samples of exposed suspension system members, including moldings, for each color and system type required.
- E. Product test reports from a qualified independent testing agency that are based on its testing of current products for compliance of acoustical panel ceilings and components with requirements.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced Installer who has completed acoustical panel ceilings similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical panels and suspension system components to Project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.
- C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.6 PROJECT CONDITIONS

- A. Space Enclosure and Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet-work in spaces is completed and dry, work above ceilings is complete, and ambient temperature and humidity conditions are being maintained at the levels required by manufacturer(s) to eliminate sagging or curling of ceiling panels.

1.7 COORDINATION

- A. Coordinate layout and installation of acoustical panels and suspension system components with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system components (if any), and partition assemblies (if any).

1.8 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels clearly describing contents.
 - 1. Acoustical Ceiling Units: Furnish quantity of full-size units equal to 2.0 percent of amount installed.

PART 2 - PRODUCTS

2.1 ACOUSTICAL CEILING UNITS, GENERAL:

- A. Standard for Acoustical Ceiling Units: Provide manufacturer's standard units of configuration indicated that comply with ASTM E 12643 classifications as designated by reference to types, patterns, acoustical ratings, and light reflectances, unless otherwise indicated.
 - 1. Mounting Method for Measuring NCR: Type E-400 (plenum mounting in which face of test specimen is 15-3/4 inches away from the test surface) per ASTM RE 795.

- B. Colors and Patterns: Provide products to match appearance characteristics indicated under each product type.

2.2 HIGH ACOUSTICS, SAG-RESISTANT ACOUSTICAL PANELS

- A. Description: Provide Type III, Form 2, Pattern CD units per ASTM E 1264 with painted finish; and as follows:
 - 1. Performance Criteria: LR 0.83, min; NRC 0.70, min.; CAC 35,min.
 - 2. Edge Detail: Square. Install in wide-face suspension system.
 - 3. Size: 24 inches by 24 inches by 5/8 inch, min., typical.
 - 4. Color: White.
 - 5. Panels are scheduled as "APC-1" on drawings.
- B. Product: Subject to compliance with requirements, provide one of the following:
 - 1. "School Zone Fine Fissured No. 1713"; Armstrong World Industries.
 - 2. "Fine Fissured High NRC No. HHF-457"; CertainTeed.
 - 3. "Radar ClimaPlus High CAC, High NRC No. 22421"; USG Interiors.
- C. Warranty: Provide manufacturer's standard limited 10 year warranty against sag of ceiling panels.

2.3 CERAMIC AND MINERAL FIBER COMPOSITE PANELS

- A. Description: Provide high density, ceramic-base panels classified as noncombustible by the NFPA, flame spread- 0; smoke developed- 0.
 - 1. Performance Criteria: LR 0.80; NRC 0.45-0.55; CAC 40-44.
 - 2. Edge Detail: Square. Install in wide-face suspension system.
 - 3. Size: 24 inches by 24 inches by 5/8 inch.
 - 4. Color: White.
 - 5. Panels are scheduled as "APC-2" on drawings.
- B. Products: Subject to compliance with requirements, provide one of the following:
 - 1. "Fine Fissured Ceramaguard – Perforated, No. 607"; Armstrong World Industries, or approved equal.
 - 2. "Radar Ceramic ClimaPlus, No. 56644"; USG Interiors.

2.4 METAL SUSPENSION SYSTEMS, GENERAL

- A. Metal Suspension System Standard: Provide manufacturer's standard metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable ASTM C 635 requirements.
- B. Finishes and Colors: Provide manufacturer's standard factory-applied finish for type of system indicated.

- C. Attachment Devices: Size for 5 times the design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.
- D. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
 - 1. Zinc-Coated Carbon Steel Wire: ASTM A 641 (ASTM A 641M), Class 1 zinc coating, soft temper.
 - 2. Size: Select wire diameter so that its stress at 3 times the hanger design load (ASTM C 635, Table 1, Direct Hung) will be less than the yield stress of wire, but provide not less than 0.106-inch diameter (12 gage) wire.
- E. Sheet-Metal Edge Moldings and Trim: Type and profile indicated, or if not indicated, manufacturer's standard moldings for edges and penetrations that fit acoustical panel edge details and suspension systems indicated; formed from sheet metal of same material and finish as that used for exposed flanges of suspension system runners.
 - 1. Provide stepped, reveal edge molding ("Shadow Molding"), typical.
 - a. Product: Armstrong "Shadow Molding No. 7871" or equal by ROCKFON or Donn with $\frac{3}{4}$ " x $\frac{3}{4}$ " reveal.

2.5 NON-FIRE-RESISTANCE-RATED, DIRECT-HUNG SUSPENSION SYSTEMS

- A. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from hot dipped galvanized, cold-rolled steel sheet, with prefinished 15/16-inch wide metal caps on flanges; other characteristics as follows:
 - 1. Structural Classification: Intermediate-duty system.
 - 2. End Condition of Cross Runners: Override (stepped) type.
 - 3. Cap Material and Finish: Hot dipped galvanized steel sheet painted white.
- B. Products: Subject to compliance with requirements, provide one of the following:
 - 1. Standard Grid (for APC-1 and APC-2).
 - a. "Prelude 15/16" Exposed Tee System"; Armstrong World Industries.
 - b. Series 200 – "H" Hot Dipped; Chicago Metallic.
 - c. "Donn DX"; Donn/USG Interiors, Inc., flat white #050.
- C. Warranty: Manufacturer's standard limited 10-year warranty against rusting of grid.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other

Sections that affect ceiling installation and anchorage. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Coordination: Furnish layouts for cast-in-place anchors, clips, and other ceiling anchors whose installation is specified in other Sections.
 - 1. Furnish cast-in-place anchors and similar devices to other trades for installation well in advance of time needed for coordinating other work.
- B. Measure each ceiling area and establish the layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and conform to the layout shown on reflected ceiling plans.

3.3 INSTALLATION

- A. General: Install acoustical panel ceilings to comply with publications referenced below per manufacturer's instructions and CISCA "Ceiling Systems Handbook."
 - 1. Standard for Ceiling Suspension System Installations: Comply with ASTM C 636.
- B. Suspend ceiling hangers from building's structural members and as follows:
 - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of the supporting structure or of the ceiling suspension system.
 - 2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 - 3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with the location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
 - 4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of 3 tight turns. Connect hangers either directly to structures or to inserts, eye screws, or other devices that are secure, that are appropriate for substrate, and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
 - 5. Do not attach hangers to steel roof deck. Attach hangers to structural members.
 - 6. Space hangers not more than 48 inches o.c. along each member supported directly from hangers, unless otherwise shown; and provide hangers not more than 8 inches from ends of each member.
- C. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.

1. Screw attach moldings to substrate at intervals not over 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.
 2. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- D. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- E. Install acoustical panels with undamaged edges and fitted accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide neat, precise fit.
1. Arrange directionally patterned acoustical panels as follows:
 - a. Install panels with pattern running in one direction parallel to long axis of space.
 2. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension system runners and moldings.

3.4 CLEANING

- A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095113

SECTION 096500 - RESILIENT FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Rubber athletic flooring.
- B. Related Sections include the following:
 - 1. Division 9 Section "Resilient Wall Base and Accessories" for resilient wall base.

1.3 SUBMITTALS

- A. Product Data: For each type of product specified.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of units or sections of units showing the full range of colors and patterns available for each type of product indicated.
- C. Samples for Verification: Samples of each different color and pattern of resilient floor tile specified, showing the full range of variations expected in these characteristics.
- D. Maintenance Data: For rubber flooring to include in the maintenance manuals specified in Division 1.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer to perform work of this Section who has specialized in installing resilient products similar to those required for this Project and with a record of successful in-service performance.
- B. Fire-Test-Response Characteristics: Provide products with the following fire-test-response characteristics as determined by testing identical products per test method indicated below by a testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Critical Radiant Flux: 0.45 W/sq. cm or greater when tested per ASTM E 648.

2. Smoke Density: Maximum specific optical density of 450 or less when tested per ASTM E 662.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to Project site in manufacturer's original, unopened cartons and containers, each bearing names of product and manufacturer, Project identification, and shipping and handling instructions.
- B. Store products in dry spaces protected from the weather, with ambient temperatures maintained between 50 and 90 deg F.
- C. Move products into spaces where they will be installed at least 48 hours before installation, unless longer conditioning period is recommended in writing by manufacturer.

1.6 PROJECT CONDITIONS

- A. Do not install products until they are at the same temperature as the space where they are to be installed.
- B. Close spaces to traffic during flooring installation and for time period after installation recommended in writing by manufacturer.
- C. Install flooring and accessories after other finishing operations, including painting, have been completed.
- D. Do not install flooring over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive, as determined by flooring manufacturer's recommended bond and moisture test.

1.7 EXTRA MATERIALS

- A. Deliver extra materials to Owner.

PART 2 - PRODUCTS

2.1 RUBBER ATHLETIC FLOORING

- A. Resilient rubber flooring made from recycled rubber and specifically designed for use as an athletic activity surfacing material.
 1. Manufacturer: Regupol America, "AKTIV Sports and Fitness Surfaces, 35000 Series.

2. Color and Pattern: "Strength Series", Color as selected by Architect.
3. Form: Roll goods; 48" wide.
4. Thickness: 3/8".
5. Impact Insulation Class (ASTM E492): 45 minimum.
6. Recycled Content:
 - a. Flooring to be comprised of shredded and cleaned SBR tire rubber (100% post-consumer waste) and colored EPDM flecks (30% pre-consumer waste).
7. Product to be odorless.

2.2 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based formulation provided or approved by flooring manufacturer for applications indicated.
- B. Adhesives: Low VOC, water-resistant type, one-component polyurethane recommended by manufacturer to suit resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where installation of resilient products will occur, with Installer present, for compliance with manufacturer's requirements. Verify that substrates and conditions are satisfactory for resilient product installation and comply with requirements specified.
- B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:
 1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by flooring manufacturer.
 2. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
- C. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Comply with resilient product manufacturer's written installation instructions for preparing substrates indicated to receive resilient products.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.
- C. Remove coatings, including curing compounds, and other substances that are incompatible with flooring adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
- D. Broom and vacuum clean substrates to be covered immediately before product installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.3 RUBBER ATHLETIC FLOORING INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor coverings.
- B. Unroll floor coverings and allow them to stabilize before cutting and fitting.
- C. Lay out floor coverings as follows:
 - 1. Maintain uniformity of floor covering direction.
 - 2. Minimize number of seams; place seams in inconspicuous and low-traffic areas, at least 6 inches away from parallel joints in floor covering substrates.
 - 3. Match edges of floor coverings for color shading at seams.
 - 4. Avoid cross seams.
- D. Scribe and cut floor coverings to butt neatly and tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, and door frames.
- E. Extend floor coverings into toe spaces, door reveals, closets, and similar openings.
- F. Maintain references markers, holes, or openings that are in place or marked for future cutting by repeating on floor coverings as marked on substrates. Use chalk or other nonpermanent marking device.
- G. Adhere floor coverings to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.4 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing resilient products:

1. Remove adhesive and other surface blemishes using cleaner recommended by resilient product manufacturers.
 2. Sweep or vacuum floor thoroughly.
 3. Do not wash floor until after time period recommended by flooring manufacturer.
 4. Damp-mop floor to remove marks and soil.
- B. Protect flooring against mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by flooring manufacturer.
- C. Do not move heavy and sharp objects directly over floor surfaces. Place plywood or hardboard panels over flooring and under objects while they are being moved. Slide or roll objects over panels without moving panels.
- D. Clean floor surfaces not more than 4 days before dates scheduled for inspections intended to establish date of Substantial Completion in each area of Project. Clean products according to manufacturer's written recommendations.

END OF SECTION 096500

SECTION 096530 - RESILIENT WALL BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Resilient wall base.
- B. Related Sections include the following:
 - 1. Division 9 Section "Resilient Flooring."

1.3 SUBMITTALS

- A. Product Data: For each type of product specified.
- B. Samples for Initial Selection: Manufacturer's standard sample sets consisting of sections of units showing the full range of colors and patterns available for each type of product indicated.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer to perform work of this Section who has specialized in installing resilient products similar to those required for this Project and with a record of successful in-service performance.
- B. Source Limitations: Obtain each type and color of product specified from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to Project site in manufacturer's original, unopened cartons and containers, each bearing names of product and manufacturer, Project identification, and shipping and handling instructions.
- B. Store products in dry spaces protected from the weather, with ambient temperatures maintained between 50 and 90 deg F.

- C. Move products into spaces where they will be installed at least 48 hours before installation, unless longer conditioning period is recommended in writing by manufacturer.

1.6 PROJECT CONDITIONS

- A. Do not install products until they are at the same temperature as the space where they are to be installed.
- B. Coordinate resilient product installation with other construction to minimize possibility of damage and soiling during remainder of construction period. Install resilient products after other finishing operations, including painting, have been completed.

1.7 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.
 - 1. Furnish not less than 10 linear feet for each 500 linear feet for fraction thereof, of each different type, color, pattern, and size of resilient product installed.
 - 2. Deliver extra materials to Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide one of the products indicated for each designation.

2.2 RESILIENT WALL BASE

- A. Rubber Wall Base: Products complying with FS SS-W-40, Type II and with requirements specified:
 - 1. Color: As selected by Architect from manufacturer's full range of colors.
 - 2. Style: Cove with top-set toe.
 - 3. Minimum thickness: 1/8 inch.
 - 4. Height: 4 inches.
 - 5. Lengths: Coils in lengths standard with manufacturer.
 - 6. Outside Corners: Formed on job.

- 7. Surface: Smooth.
- 8. Manufacturer: One of the following:
 - a. Afco Rubber Corp.
 - b. Armstrong World Industries
 - c. Azrock Industries, Inc.
 - d. Johnsonite
 - e. Mercer Products Co., Inc.
 - f. Flexco
 - g. Roppe Corporation
 - h. Tarkett, Inc.
 - i. VPI Floor Products Division

2.3 INSTALLATION ACCESSORIES

- A. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where installation of resilient products will occur, with Installer present, for compliance with manufacturer's requirements, including those for maximum moisture content. Verify that substrates and conditions are satisfactory for resilient product installation and comply with requirements specified. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Comply with manufacturer's written installation instructions for preparing substrates indicated to receive resilient products.

3.3 INSTALLATION

- A. General: Install resilient products according to manufacturer's written installation instructions.
- B. Apply resilient wall base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
 - 1. Install wall base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
 - 2. Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

3. Do not stretch base during installation.
 4. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.
 5. Form outside corners on job, from straight pieces of maximum lengths possible, without whitening at bends. Shave back of base at points where bends occur and remove strips perpendicular to length of base that are only deep enough to produce a snug fit without removing more than half the wall base thickness.
 6. Form inside corners on job, from straight pieces of maximum lengths possible, by cutting an inverted V-shaped notch in toe of wall base at the point where corner is formed. Shave back of base where necessary to produce a snug fit to substrate.
- C. Place resilient products so they are butted to adjacent materials and bond to substrates with adhesive.

3.4 CLEANING AND PROTECTING

- A. Perform the following operations immediately after installing resilient products:
1. Remove adhesive and other surface blemishes using cleaner recommended by resilient product manufacturers.
 2. Do not wash resilient products until after time period recommended by resilient product manufacturer.
- B. Protect resilient products against mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by resilient product manufacturer.
- C. Clean resilient products not more than 4 days before dates scheduled for inspections intended to establish date of Substantial Completion in each area of Project. Clean products according to manufacturer's written recommendations.

END OF SECTION 096530

SECTION 099100 - PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes surface preparation and field painting of the following:
 - 1. Exposed exterior items and surfaces.
 - 2. Exposed interior items and surfaces.
 - 3. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.
- B. Paint exposed surfaces, except where the paint schedules indicate that a surface or material is not to be painted or is to remain natural. If the paint schedules do not specifically mention an item or a surface, paint the item or surface the same as similar adjacent materials or surfaces whether or not schedules indicate colors. If the schedules do not indicate color or finish, the Architect will select from paint manufacturer's standard colors and finishes available.
- C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.
 - 1. Labels: Do not paint over Underwriters Laboratories (UL), Factory Mutual (FM), or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

1.3 DEFINITIONS

- A. General: Standard coating terms defined in ASTM D 16 apply to this Section.
 - 1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
 - 2. Eggshell refers to low-sheen finish with a gloss range between 5 and 20 when measured at a 60-degree meter.
 - 3. Satin refers to low-sheen finish with a gloss range between 15 and 35 when measured at a 60-degree meter.
 - 4. Semigloss refers to medium-sheen finish with a gloss range between 30 and 65 when measured at a 60-degree meter.
 - 5. Full gloss refers to high-sheen finish with a gloss range more than 65 when measured at a 60-degree meter.

1.4 SUBMITTALS

- A. Product Data: For each paint system specified. Include block fillers and primers.
 - 1. Material List: Provide an inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
 - 2. Manufacturer's Information: Provide manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material proposed for use.
- B. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for each type of finish-coat material indicated.

1.5 QUALITY ASSURANCE

- A. Applicator Qualifications: Engage an experienced applicator who has completed painting system applications similar in material and extent to that indicated for this Project with a record of successful in-service performance.
- B. Source Limitations: Obtain block fillers, primers, and undercoat materials for each coating system from the same manufacturer as the finish coats.
- C. Benchmark Samples (Mockups): Provide a full-coat benchmark finish sample of each type of coating and substrate required on the Project. Comply with procedures specified in PDCA P5.
 - 1. The Architect will select one room surface to represent surfaces and conditions for each type of coating and substrate to be painted.
 - a. Wall Surfaces: Provide samples on at least 100 sq. ft. of wall surface.
 - b. Small Areas and Items: The Architect will designate an item or area as required.
 - 2. After permanent lighting and other environmental services have been activated, apply coatings in this room or to each surface according to the Schedule or as specified. Provide required sheen, color, and texture on each surface.
 - 3. Final approval of colors will be from job-applied samples.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the Project Site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label, and the following information:
 - 1. Product name or title of material.
 - 2. Product description (generic classification or binder type).
 - 3. Manufacturer's stock number and date of manufacture.

4. Contents by volume, for pigment and vehicle constituents.
 5. Thinning instructions.
 6. Application instructions.
 7. Color name and number.
 8. VOC content.
- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain containers used in storage in a clean condition, free of foreign materials and residue.
1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

1.7 PROJECT CONDITIONS

- A. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 and 90 deg F.
- B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 and 95 deg F.
- C. Do not apply paint in rain, fog, or mist; or when the relative humidity exceeds 85 percent; or at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Unless otherwise specified, paint materials and systems specified herein are those of PPG Paints or PPG - Porter Paints. Subject to compliance with requirements, equivalent materials and systems by one of the following manufacturers are also acceptable:
1. Benjamin Moore and Co. (Moore).
 2. Pratt and Lambert (P & L).
 3. Glidden.
 4. Sherwin Williams

2.2 PAINT MATERIALS, GENERAL

- A. Material Compatibility: Provide block fillers, primers, undercoats, and finish-coat materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
- B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified. Paint-material containers not displaying manufacturer's product identification will not be acceptable.
- C. Colors: Provide color selections made by the Architect.

2.3 LEAD CONTENT

- A. The paint shall comply with the latest requirements of the Federal Government for maximum allowable lead content. Such compliance shall be stated on the MSDS and container clearly identifying the product.

2.4 VOC COMPLIANCE

- A. The paint shall comply with the latest requirements of Federal, Florida State, City or Local Government requirements for the maximum allowable VOC content at the time of purchase. Such compliance shall be stated on the MSDS and container clearly identifying the product.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with the Applicator present, under which painting will be performed for compliance with paint application requirements.
 - 1. Do not begin to apply paint until unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
 - 2. Start of painting will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.
- B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
 - 1. Notify the Architect about anticipated problems using the materials specified over substrates primed by others.

3.2 PREPARATION

- A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of the size or weight of the item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.

- B. Cleaning: Before applying paint or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Remove oil and grease before cleaning.
 - 1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

- C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.
 - 1. Provide barrier coats over incompatible primers or remove and reprime.
 - 2. Cementitious Materials: Prepare concrete and concrete masonry surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
 - a. Use abrasive blast-cleaning methods if recommended by paint manufacturer.
 - b. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not paint surfaces where moisture content exceeds that permitted in manufacturer's written instructions.
 - 3. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.
 - a. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately on delivery.
 - 4. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with the Steel Structures Painting Council's (SSPC) recommendations.
 - a. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with the same primer as the shop coat.

5. Galvanized Surfaces: Clean galvanized surfaces with nonpetroleum-based solvents so surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.
- D. Materials Preparation: Mix and prepare paint materials according to manufacturer's written instructions.
1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
 2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
 3. Use only thinners approved by paint manufacturer and only within recommended limits.

3.3 APPLICATION

- A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.
1. Paint colors, surface treatments, and finishes are indicated in the schedule.
 2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
 3. Provide finish coats that are compatible with primers used.
 4. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convector covers, grilles, and similar components are in place. Extend coatings in these areas, as required, to maintain the system integrity and provide desired protection.
 5. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before the final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 6. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
 7. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
 8. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
 9. Sand lightly between each succeeding enamel or varnish coat.
- B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
1. The number of coats and the film thickness required are the same regardless of application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
 2. Omit primer on metal surfaces that have been shop primed and touchup painted.

3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
 4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat of paint does not cause the undercoat to lift or lose adhesion.
- C. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions. All metal surfaces shall be sprayed except that piping, conduit, and ductwork may be brushed or rolled.
1. Brushes: Use brushes best suited for the type of material applied. Use brush of appropriate size for the surface or item being painted.
 2. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by the manufacturer for the material and texture required.
 3. Spray Equipment: Use airless spray equipment with orifice size as recommended by the manufacturer for the material and texture required.
- D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate. Provide the total dry film thickness of the entire system as recommended by the manufacturer.
- E. Utility items to be painted include, but are not limited to, the following:
1. Exposed conduit and fittings and exterior switchgear.
 2. All exposed piping; paint fire sprinkler piping red.
- F. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.
- G. Prime Coats: Before applying finish coats, apply a prime coat of material, as recommended by the manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn through or other defects due to insufficient sealing.
- H. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.
- I. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, runs, cloudiness, color irregularity, brush marks, orange peel, nail holes, or other surface imperfections.
1. Provide satin finish for final coats.

- J. Stipple Enamel Finish: Roll and redistribute paint to an even and fine texture. Leave no evidence of rolling, such as laps, irregularity in texture, skid marks, or other surface imperfections.
- K. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

3.4 FIELD QUALITY CONTROL

- A. The Owner reserves the right to invoke the following test procedure at any time and as often as the Owner deems necessary during the period when paint is being applied:
 - 1. The Owner will engage the services of an independent testing agency to sample the paint material being used. Samples of material delivered to the Project will be taken, identified, sealed, and certified in the presence of the Contractor.
 - 2. The testing agency will perform appropriate tests for the following characteristics as required by the Owner:
 - a. Quantitative material analysis.
 - b. Abrasion resistance.
 - c. Apparent reflectivity.
 - d. Flexibility.
 - e. Washability.
 - f. Absorption.
 - g. Accelerated weathering.
 - h. Dry opacity.
 - i. Accelerated yellowness.
 - j. Recoating.
 - k. Skinning.
 - l. Color retention.
 - m. Alkali and mildew resistance.
 - 3. The Owner may direct the Contractor to stop painting if test results show material being used does not comply with specified requirements. The Contractor shall remove noncomplying paint from the site, pay for testing, and repaint surfaces previously coated with the rejected paint. If necessary, the Contractor may be required to remove rejected paint from previously painted surfaces if, on repainting with specified paint, the 2 coatings are incompatible.

3.5 CLEANING

- A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from the site.
 - 1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping. Be careful not to scratch or damage adjacent finished surfaces.

3.6 PROTECTION

- A. Protect work of other trades, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.
- B. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.
 - 1. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

3.7 PAINT SCHEDULE

- A. General: Provide the following paint systems for the various substrates, as indicated.
 - 1. Exterior Stucco: Satin Acrylic Exterior Paint.
 - a. Prime Coat: Hot Stucco Primer.
 - 1) PPG Paints: 4-603 Perma-Crete Interior/Exterior Alkali-Resistant Primer
 - b. First and Second Finish Coats: Satin Acrylic Exterior Paint
 - 1) Porter: 739 Acri-Shield Satin Exterior Acrylic.
 - 2. Exterior and Interior Hollow Metal Doors, Door Frames, and Window Frames: Semi-Gloss Acrylic Enamel Finish, spray applied.
 - a. Prime Coat: Spot Prime Scratched or Abraded Areas Only – Rust Inhibitive Alkyd Metal Primer.
 - 1) PPG Paints: 90-912 Pitt-Tech Plus Interior/Exterior DTM Industrial Primer.
 - b. First and Second Finish Coats: Semi-Gloss Acrylic Enamel.
 - 1) PPG Paints: 90-1210 Series Interior/Exterior Acrylic Semi-Gloss DTM Industrial Enamel
 - 3. Sectional Overhead Doors (Exterior side only): Acrylic Gloss Exterior Paint.
 - a. Prime Coat: Spot prime scratched or abraded factory-finished areas only-rust inhibitive alkyd metal primer.
 - 1) PPG Paints: 90-912 Pitt-Tech Plus Interior/Exterior DTM Industrial Primer.

- b. Finish Coat: High-Sheen Gloss Acrylic Enamel.
 - 1) PPG Paints: 90-1310 Series Interior/Exterior Acrylic High Gloss DTM Industrial Enamel. Apply by spraying one full bodied coat, plus any additional coats required for uniform color.
- 4. Exterior Galvanized Metal: Acrylic Gloss Exterior Paint.
 - a. Preparation: Wipe down with naphtha; apply Porter: 5 Galva-Prep; wash clean.
 - b. Prime Coat: Rust Inhibitive, 100% Acrylic Metal Primer.
 - 2) PPG Paints: 90-912 Pitt-Tech Plus Interior/Exterior DTM Industrial Primer.
 - c. First and Second Finish coats: High-Sheen Gloss Acrylic Enamel.
 - 1) Porter: 619 Acri-Shield Gloss Exterior Acrylic Paint.
- 5. Interior Concrete Block; Semi-Gloss Acrylic Epoxy.
 - a. Prime Coat: Latex Block Filler.
 - 1) PPG Paints: 6-15 Speedhide Masonry Hi Fill Latex Block Filler.
 - b. First and Second Finish Coats: Semi-Gloss Acrylic Epoxy.
 - 1) PPG Paints: 16-510 Pitt-Glaze WB1 Water-Borne, Pre-Catalyzed, Acrylic Epoxy.
- 6. Interior Gypsum Wallboard (Typical Finish); Eggshell Latex.
 - a. Prime Coat: Latex Primer Sealer.
 - 1) PPG Paints: 6-2 Speedhide Interior Latex Quick-Drying Sealer.
 - b. First and Second Coats: Eggshell Latex Enamel.
 - 1) PPG Paints: 6-4310 Series Speedhide Zero Interior Zero VOC Latex Eggshell Enamel.
- 7. Interior Gypsum Wallboard for the Following Rooms ONLY: Unisex Toilet 110; Women's Toilet 119; Men's Toilet 120; Satin-Gloss Acrylic Epoxy Paint.
 - a. Prime Coat: Latex Primer Sealer.
 - 1) PPG Paints: 6-2 Speedhide Interior Latex Quick-Drying Sealer.
 - b. First and Second Finish Coats: Semi-Gloss Acrylic Epoxy.

- 1) PPG Paints: 16551 Pitt-Glaze WB Water-Borne Acrylic Epoxy.
8. Interior Gypsum Drywall Ceilings; Eggshell Acrylic Latex Paint.
 - a. Prime Coat: Latex Primer Sealer.
 - 1) PPG Paints: 6-2 Speedhide Interior Latex Quick-Drying Sealer.
 - b. First and Second Finish Coats: Eggshell Latex Enamel.
 - 1) PPG Paints: 6-4310 Series Speedhide Zero Interior Zero VOC Latex Eggshell Enamel.
 9. Exterior Aluminum; Satin Acrylic Enamel Finish.
 - a. Preparation: Acid Etch with Krud Kutter Metal Clean and Etch or equal.
 - b. Prime Coat:
 - 1) PPG Paints: 90-912 Pitt-Tech Plus Interior/Exterior DTM Industrial Primer.
 - c. First Finish Coat: Satin Acrylic Exterior Paint.
 - 1) Porter: 739 Acri-Shield Satin Exterior Acrylic paint.
 10. Exterior Exposed Stainless Steel Flashing; Satin Acrylic Enamel Finish.
 - a. Preparation: Hand sand to roughen surface; solvent clean.
 - b. Prime Coat:
 - 1) PPG Paints: 90-912 Pitt-Tech Plus Interior/Exterior DTM Industrial Primer.
 - c. First and Second Finish Coats: Satin Acrylic Exterior Paint.
 - 1) Porter 739 Acri-Shield Satin Exterior Acrylic Paint.

END OF SECTION 099100

SECTION 101400 - SIGNS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following types of signs:

1. Panel signs.
2. Dimensional letters and numbers.
3. Cast metal insignia plaques.

1.3 SUBMITTALS

- A. General: Submit the following according to the Conditions of the Contract.
- B. Product data for each type of sign specified, including details of construction relative to materials, dimensions of individual components, profiles, and finishes.
- C. Shop drawings showing fabrication and erection of signs. Include plans, elevations, and large-scale sections of typical members and other components. Show anchors, grounds, layout, reinforcement, accessories, and installation details.
 1. Provide message list for each sign required, including large-scale details of wording and lettering layout.
 2. Templates: Furnish full-size spacing templates for individually mounted dimensional letters and numbers.
- D. Samples: Provide the following samples of each sign component for initial selection of color, pattern and surface texture as required and for verification of compliance with requirements indicated.
 1. Samples for initial selection of color, pattern, and texture:
 - a. Cast Acrylic Sheet and Melamine Sheet: Manufacturer's color charts consisting of actual sections of material including the full range of colors available for each material required.
 - b. Aluminum: Samples of each finish type and color, on 6-inch-long sections of extrusions and not less than 4-inch squares of sheet or plate, showing the full range of colors available.

2. Samples for verification of color, patterns, and texture selected and compliance with requirements indicated:
 - a. Cast Acrylic Sheet and Melamine Sheet: Provide a sample panel not less than 8-1/2 inches by 11 inches for each material, color, texture, and pattern required. On each panel include a representative sample of the graphic image process required, showing graphic style, and colors and finishes of letters, numbers, and other graphic devices.
 - b. Dimensional Letters: Provide full-size representative samples of each dimensional letter type required, showing letter style, color, and material finish and method of attachment.

1.4 QUALITY ASSURANCE

- A. Sign Fabricator Qualifications: Firm experienced in producing signs similar to those indicated for this Project, with a record of successful in-service performance, and sufficient production capacity to produce sign units required without causing delay in the Work.
- B. Single-Source Responsibility: For each separate sign type required, obtain signs from one source of a single manufacturer.
- C. All signs shall conform to all requirements of the Americans with Disabilities Act, 2010 ADA Standards for Accessible Design, Section 216 – Signs.

1.5 PROJECT CONDITIONS

- A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication to ensure proper fitting. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Manufacturers of Panel Signs:
 - a. APCO Graphics, Inc.
 - b. ASI Sign Systems, Inc.
 - c. Clarke Systems
 - d. Best Sign Systems
 - e. Mohawk Sign Systems

2. Manufacturers of Dimensional Letters and Metal Plaques:

- a. Allen Industries, Inc.
- b. APCO Graphics, Inc.
- c. A.R.K. Ramos Manufacturing Company, Inc.
- d. ASI Sign Systems, Inc.
- e. Gemini Incorporated
- f. Metal Arts
- g. The Southwell Company

2.2 PANEL SIGNS FOR ROOM IDENTIFICATION

- A. Panel signs shall be minimum 1/8" thick (excluding thickness of raised sign letters) melamine or acrylic plastic with 1/32" thick raised characters with Grade 2 Braille.
 1. At sign manufacturer's option, the minimum 1/8" thickness of the panel can be achieved by laminating a base layer of melamine or acrylic to the top layer containing the integral raised characters. Edges shall be ground smooth.
 2. The characters and background of signs shall be eggshell, matte, or other non-glare finish. Characters and symbols shall contrast with the background – either light characters on a dark background or dark characters on a light background. Submit manufacturer's standard palette of colors meeting these requirements to Architect for selection.
 3. Graphics and text are to be etched to achieve correctly spaced and accurately reproduced sharp, true characters and Braille. The text shall be an integral part of the sign and not applied to the plate with adhesive or chemicals. Text height is to be determined within the range of 5/8" up to 2". Graphics are etched into the face prior to the application of the background color.
- B. Room identification and number signs are to be provided at each interior door opening and at certain exterior door openings where indicated on drawings.
 1. Provide an identification number sign at swinging doors or pairs of doors leading to a room as indicated on drawings. Room numbers to be as indicated on drawings.
 2. Provide an identification name sign at swinging doors or pairs of doors leading to a room as indicated on drawings.
 - a. In addition to room number and name signs, include a pictogram of the international symbol of accessibility at each toilet room.
 - b. Example:

Room Number Sign	: 120
Room Name Sign	: Men's Toilet
Pictogram	: Accessibility Symbol
3. General Description of Signs.

- a. Room number signs shall be combined with room identification signs.
 - 1. Room numbers shall be ¾" Helvetica Medium Letters centered on sign (capital letter for suffix).
 - 2. Grade 2 Braille centered below number on all signs.
 - 3. Number shall be combined with Identification Sign on a single panel.
- b. Room Identification Signs.
 - 1. Room identification letters shall be 5/8" upper and lower case Helvetica Medium letters centered on sign.
 - 2. Grade 2 Braille centered on sign.
- 4. Fabrication: Provide 9 inch by 9 inch overall size. Sign edges are to be straight and free from saw marks or any other imperfections. Corners shall be rounded, with ¼" to 3/8" radius.

2.3 CAST DIMENSIONAL LETTERS AND NUMBERS

- A. Cast Letters and Numbers: Form individual letters and numbers by casting aluminum. Produce characters with smooth, flat faces, sharp corners, and precisely formed lines and profiles, free from pits, scale, sand holes, or other defects. Cast lugs into the back of characters and tap to receive threaded mounting studs. Comply with requirements indicated for finish, style, and size.
- B. Finish: High gloss polyurethane enamel or polyester powder coat in manufacturer's standard colors (two, maximum) to be selected by Architect. Provide manufacturer's standard, clear overcoat.
- C. Typeface: Helvetica Medium.
- D. Sizes: 8" high x 3/4" thick for main building sign; 6" high x 3/4" thick for monument sign and for street number sign as indicated on drawings.

2.4 CAST METAL INSIGNIA PLAQUES

- A. Fire Rescue Maltese Cross Plaques: Castings shall be free from pits, scales, sand holes, or other defects. Comply with requirements specified for metal, border style, background texture, and finish and with requirements shown for thickness, size, shape, and copy. Hand-tool and buff borders and raised copy to produce the manufacturer's standard satin polished finish.
 - 1. Metal: Aluminum.
 - 2. Border Style: Raised flat band.
 - 3. Background texture: Manufacturer's standard stipple texture.
 - 4. Background Finish: Provide the manufacturer's standard baked-enamel finish.
 - 5. Raised Character Finish: Provide the manufacturer's standard baked-enamel finish, semi-gloss, with semi-gloss clear overcoat.

6. Colors: Minimum of 6 different colors to be selected by Architect from manufacturer's standards.
7. Size: 18" overall out-to-out, 1" thickness for freestanding monument sign (two required); 24" overall out-to-out, 1" thickness for main building (one required).

PART 3 – EXECUTION

3.1 INSTALLATION

- A. General: Locate sign units and accessories where indicated, using mounting methods of the type described and in compliance with the manufacturer's instructions.
 1. Install signs level, plumb, and at the height indicated, with sign surfaces free from distortion or other defects in appearance.
- B. Room Identification Signs: Mount on adjoining walls and locate signs adjacent to the latch side of the door. In case of conflicts with closely spaced doors, with vision panels or where there is no wall space to the latch side of the door, notify Architect. Verify all sign locations with Architect prior to installation.
- C. Wall Mounted Signs: Attach signs to wall surfaces using a minimum of two stainless steel screws. For exterior signs, use four stainless steel screws. Use expansion shields for screws set in masonry; use "Molly" type hollow wall fasteners for screws set in gypsum board or plaster.
 1. Mounting shall be at a height of 60" to the centerline of the sign (to centerline of top sign when two signs are mounted one above the other).
- D. Dimensional Letters and Numbers: Mount letters and numbers using standard fastening methods recommended by the manufacturer for letter form, type of mounting, wall construction, and condition of exposure indicated. Provide heavy paper template to establish letter spacing and to locate holes for fasteners.
 1. Projected Mounting: Mount cast letters at a 1" projection distance from the wall surface indicated using projecting studs and spacers.
- E. Cast Metal Insignia Plaques: Mount plaques at a 1" projection distance from the wall surface indicated using projecting studs and spacers.

3.2 CLEANING AND PROTECTION

- A. After installation, clean soiled sign surfaces according to the manufacturer's instruction. Protect units from damage until acceptance by the Owner.

END OF SECTION 101400

SECTION 102800 - TOILET AND BATH ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes toilet and bath accessory items as scheduled.

1.3 SUBMITTALS

- A. General: Submit the following according to Conditions of Contract and Division 1 Specifications Sections.
- B. Product data for each toilet accessory item specified, including construction details relative to materials, dimensions, gages, profiles, mounting method, specified options, and finishes.
- C. Setting drawings where cutouts are required in other work, including templates, substrate preparation instructions, and directions for preparing cutouts and installing anchorage devices.
- D. Maintenance instructions including replaceable parts and service recommendations.

1.4 QUALITY ASSURANCE

- A. Inserts and Anchorages: Furnish accessory manufacturers' standard inserts and anchoring devices that must be set in concrete or built into masonry. Coordinate delivery with other work to avoid delay.

1.5 PROJECT CONDITIONS

- A. Coordination: Coordinate accessory locations, installation, and sequencing with other work to avoid interference with and ensure proper installation, operation, adjustment, cleaning, and servicing of toilet accessory items.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Specifications are based upon products by Bobrick Washroom Equipment, Inc. unless noted otherwise. Subject to compliance with requirements, equivalent toilet accessories by one of the following manufacturers are also acceptable:
1. A & J Washroom Accessories.
 2. American Specialties, Inc.
 3. Bradley Corporation.
 4. McKinney/Parker.

2.2 MATERIALS, GENERAL

- A. Stainless Steel: AISI Type 302/304, with polished No. 4 finish, 0.034 inch minimum thickness.
- B. Brass: Leaded and unleaded, flat products, ASTM B 19; rods, shapes, forgings, and flat products with finished edges, ASTM B 16 (ASTM B 16M); Castings, ASTM B 30.
- C. Sheet Steel: Cold-rolled, commercial quality ASTM A 366 (ASTM A 366M), 0.04 inch minimum. Surface preparation and metal pretreatment as required for applied finish.
- D. Galvanized Steel Sheet: ASTM A 527 G60 (ASTM A 527M Z180).
- E. Chromium Plating: Nickel and chromium electro-deposited on base metal, ASTM B 456, Type SC 2.
- F. Mirror Glass: Nominal 6.0 mm thick, conforming to ASTM C 1036, Type I, Class 1, Quality q2, and with silvering, electro-plated copper coating, and protective organic coating.
- G. Galvanized Steel Mounting Devices: ASTM A 153, hot-dip galvanized after fabrication.
- H. Fasteners: Screws, bolts, and other devices of same material as accessory unit, or of galvanized steel where concealed.

Letters shown in parentheses indicate symbol shown on drawings:

2.3 PAPER TOWEL DISPENSERS (PTD)

- A. Surface-Mounted Towel Dispensers: Fabricate of stainless steel with hinged front equipped with tumbler lockset. Provide pierced slots at sides as refill indicator.
1. Capacity: Not less than 400 C-fold or 525 multi-fold paper towels without need for special adapters.
 2. Product: Bobrick "Model B-262."

2.4 TOILET PAPER DISPENSERS (TPD)

- A. Double-Roll Dispenser and utility shelf: Size to accommodate two separate rolls of core type tissue up to 5-1/2-inch diameter roll.
1. Fabrication: Chrome-plated plastic spindles with heavy duty internal springs, with type-304 satin-finished, stainless steel brackets designed for surface mounting. Unit includes 16" wide by 5" deep stainless steel shelf with 1/2" return edges, satin finish.
 2. Product: Bobrick "B-2840."

2.5 GRAB BARS (GB)

- A. Stainless Steel Type: Provide grab bars with wall thickness not less than 18 gage (.050 inch) and as follows:
1. Mounting: Concealed, manufacturer's standard flanges and anchorages.
 2. Clearance: 1-1/2 inches clearance between wall surface and inside face of bar.
 3. Gripping Surfaces: Smooth satin finish.
 4. Heavy-Duty Size: Outside diameter of 1-1/2 inches.
 5. Product: Bobrick's "Series B-6806", for 36 inch (GB-36) and 42 inch(GB-42) lengths at toilet room locations as shown. Bobrick's "Series B-6861," for 15-7/8" x 30- 7/8" units at shower stall locations as shown.

2.6 SOAP DISPENSERS

- A. Surface-Mounted Units: Fabricated body and back of stainless steel; concealed mounting. Provide stainless steel piston, springs, and internal parts designed to dispense soaps, lotions and detergents in liquid form; 40 fl. Oz. capacity. Unbreakable fill window. Large locked hinged stainless steel filler top. Vandal-resistant design.
1. Product: Bobrick "Model B-4112"

2.7 MIRROR UNITS (MIR)

- A. Stainless Steel Framed Mirror Units: Fabricate frame with angle shapes of not less than 18 gage (.050 inch), with square corners mitered, welded, and ground smooth. Provide in No. 4 satin polished finish. Mirror to be 1/4" tempered glass guaranteed against silver spoilage for 15 years.
1. Product: Bobrick "Model B-2908-1836" (for toilet rooms).

2.8 SHOWER CURTAIN RODS (SCR)

- A. Stainless Steel, heavy duty type: 1" outside diameter; 18-8, type 304, 20 gage tubing with satin finish. Flanges shall be 20 gage stainless steel with satin finish.
1. Product; Bobrick "Model B-6107."

2.9 ANTIBACTERIAL SHOWER CURTAIN (SC)

- A. Antibacterial Shower Curtain: 72-inch wide by 72-inch-high, 10-ounce, nylon-reinforced, antibacterial vinyl fabric with hemmed edges. Fabric to be flameproof, stain-resistant and self-deodorizing, with stainless steel grommets at minimum 6 inches o.c. through top hem. Furnish in color as selected by Architect. Provide one per shower stall.
1. Product: A & J "Model 250A".
 2. Shower Hooks: Provide stainless steel hooks in quantity required by number of eyelets in curtains; A & J "Model UX169 Curtain Ring."

2.10 SOAP DISH (SDSH)

- A. Soap dish is furnished as an accessory with the hand-held shower. Refer to Plumbing Fixture Schedule on drawings.

2.11 FOLDING SHOWER SEAT (FSS)

- A. Heavy-duty hinged seat designed to fold up against wall when not in use. Provide support braces, hinges, frame, and fasteners of Type 304 stainless steel. Construct frame of all-welded tubular construction for maximum strength. Provide L-shaped seat, designed for easy wheelchair access. Seat material to be phenolic core slats with ivory color face sheets.
1. Product: Bobrick "Model B-5181".

2.12 ROBE HOOK (RH)

- A. Surface-Mounted Hat and Coat Hook: Heavy-duty satin-finished stainless steel hook welded to rectangular flange and support arm with backplate for concealed mounting.
1. Product: Bobrick "Model B-6727".

2.13 STAINLESS STEEL HOOK STRIP (HS)

- A. Wall mounted, three-hook unit with hooks secured to 18 gauge, 4 inch high by 24 inch long satin-finished stainless steel mounting strip.
1. Product: Bobrick "Model B-232 x 24" with three hooks at all toilet/shower rooms.

2.14 STAINLESS STEEL TOWEL BAR (TB)

- A. Stainless steel, surface-mounted towel bar with 18 inch long, $\frac{3}{4}$ " square tubing bar attached to rectangular flanges and support arms with concealed wall plates; satin-finish.
 - 1. Product: Bobrick "Model B-6737 x 18".

2.15 MOP AND BROOM HOLDER/UTILITY SHELF (MBH)

- A. Combination unit with 0.05-inch (18 gage), Type 304, stainless steel shelf with $\frac{1}{2}$ -inch returns, 0.062-inch (16 gage) support brackets for wall mounting. Provide 0.062-inch (16 gage) stainless steel hooks for wiping rags on front of shelf, together with spring-loaded, rubber hat, cam-type mop/broom holders; $\frac{1}{4}$ inch diameter stainless steel drying rod suspended beneath shelf. Provide unit 36 inches long and complete with three mop/broom holders and two hooks.
 - 1. Product: Bobrick "Model B-224 x 36".

2.16 FABRICATION

- A. General: Only a maximum 1-1/2 inch diameter, unobtrusive stamped manufacturer logo, as approved by Architect, is permitted on exposed face of toilet or bath accessory units. On either interior surface not exposed to view or back surface, provide additional identification by either a printed, waterproof label or a stamped nameplate, indicating manufacturer's name and product model number.
- B. Surface-Mounted Toilet Accessories, General: Except where otherwise indicated, fabricate units with tight seams and joints, exposed edges rolled. Hang doors or access panels with continuous stainless steel piano hinge. Provide concealed anchorage wherever possible.
- C. Recessed Toilet Accessories, General: Except where otherwise indicated, fabricate units of all-welded construction, without mitered corners. Hang doors or access panels with full-length, stainless steel piano hinge. Provide anchorage that is fully concealed when unit is closed.
- D. Framed Mirror Units, General: Fabricate frames for glass mirror units to accommodate wood, felt, plastic, or other glass edge protection material. Provide mirror backing and support system that will permit rigid, tamperproof glass installation and prevent moisture accumulation, as follows:
 - 1. Provide galvanized-steel backing sheet, not less than 0.034 inch and full mirror size, with nonabsorptive filler material. Corrugated cardboard is not an acceptable filler material.
- E. Mirror Unit Hangers: Provide system for mounting mirror units that will permit rigid, tamperproof, and theftproof installation, as follows:

1. One-piece, galvanized-steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
- F. Keys: Provide universal keys for access to toilet accessory units requiring internal access for servicing, resupply, etc. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install toilet accessory units according to manufacturers' instructions, using fasteners appropriate to substrate as recommended by unit manufacturer. Install units plumb and level, firmly anchored in locations and at heights indicated.
- B. Secure mirrors to walls in concealed, tamperproof manner with special hangers, toggle bolts, or screws. Set units plumb, level, and square at locations indicated, according to manufacturer's instructions for type of substrate involved.
- C. Install grab bars to withstand a downward load of at least 250 lbf, complying with ASTM F 446.

3.2 ADJUSTING AND CLEANING

- A. Adjust toilet accessories for proper operation and verify that mechanisms function smoothly. Replace damaged or defective items.
- B. Clean and polish all exposed surfaces strictly according to manufacturer's recommendations after removing temporary labels and protective coatings.

END OF SECTION 102800

SECTION 104415 - FIRE EXTINGUISHERS, CABINETS, AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Fire extinguishers.
 - 2. Fire extinguisher cabinets.

1.3 SUBMITTALS

- A. General: Submit the following according to the Conditions of the Contract.
- B. Product data for cabinets include rough-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type and materials, trim style, door construction, panel style, and materials.
- C. Samples for initial selection purposes in the form of manufacturer's color charts consisting of sections of units showing full range of colors, textures, and patterns available for each type of cabinet finish indicated or exposed to view.

1.4 QUALITY ASSURANCE

- A. Single-Source Responsibility: Obtain extinguishers and cabinets from one source from a single manufacturer.
- B. UL-Listed Products: Fire extinguishers shall be UL listed with UL listing mark for type, rating, and classification of extinguisher.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. J.L. Industries.

2. Larsen's Manufacturing Co.
3. Modern Metal Products by Muckle.
4. Potter-Roemer, Inc.
5. Samson Metal Products, Inc.

2.2 FIRE EXTINGUISHERS

- A. General: Provide fire extinguishers for each cabinet and other locations indicated, in colors and finishes selected by Architect from manufacturer's standard, that comply with authorities having jurisdiction.
- B. Multipurpose Dry Chemical Type: UL-rated 2-A:10:B:C, 5-lb nominal capacity, in enameled steel container.
 1. Provide at all locations except Dining/Day Room 105.
- C. Wet Chemical "K Class" Type: UL-rated 2A:1B:K, 6 liter nominal capacity, in enameled steel container.
 1. Provide at Dining/Day Room 105.

2.3 CABINETS

- A. Construction: Manufacturer's standard box, with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated. Weld joints and grind smooth. Miter and weld perimeter door frames.
- B. Fire-Rated Cabinets: UL listed with UL listing mark with fire-resistance rating of wall where it is installed. Provide wherever cabinet is to be installed in a fire-rated wall or partition.
- C. Cabinet Type: Suitable for containing the following:
 1. Fire extinguisher.
- D. Cabinet Mounting: Suitable for the following mounting conditions:
 1. Semi-recessed: Cabinet box (tub) partially recessed in walls of shallow depth.
- E. Trim Style: Fabricate trim in one piece with corners mitered, welded, and ground smooth.
 1. Exposed Trim: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
 - a. Provide 2-1/2 inch rolled edge.
- F. Door Material and Construction: Manufacturer's standard door construction, of material indicated, coordinated with cabinet types and trim styles selected.

1. Enameled Steel: Manufacturer's standard finish, hollow steel door construction with tubular stiles and rails.
- G. Identify fire extinguisher in cabinet with FIRE EXTINGUISHER lettering applied to door. Provide lettering to comply with authorities having jurisdiction for letter style, color, size, spacing, and location.
1. Application Process: Silk screen.
 2. Lettering Style: Horizontal
 3. Lettering Color: White.
- H. Door Style: Manufacturer's standard design.
1. Full-Glass Panel: Tempered glass, 1/8 inch thick.
- I. Door Hardware: Provide manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated. Provide either lever handle with cam-action latch, or exposed or concealed door pull and friction latch. Provide concealed or continuous-type hinge permitting door to open 180 degrees.

2.4 FINISHES FOR CABINETS, GENERAL

- A. Comply with NAAMM "Metal Finishes Manual" for recommendations relative to applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying temporary strippable protective covering prior to shipping.

2.5 STEEL CABINET FINISHES

- A. Surface Preparation: Solvent-clean surfaces complying with SSPS-SP 1 to remove dirt, oil, grease, and other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5 (white metal blast cleaning) or SSPC-SP 8 (pickling).
- B. Factory-Priming for Field-Painted Finish: Apply shop primer specified below immediately following surface preparation and pretreatment.
 1. Shop Primer: Manufacturer's or fabricator's standard fast-curing, lead-free, universal primer, selected for resistance to normal atmospheric corrosion, for compatibility with substrate and field-applied finish paint system indicated, and for capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.
- C. Baked-Enamel Finish: Immediately after cleaning and pretreatment, apply manufacturer's standard two-coat baked-enamel finish consisting of prime coat and thermosetting topcoat. Comply with paint manufacturer's instructions for applying and baking to achieve a minimum dry film thickness of 2.0 mils.
 5. Color: White. Paint the following:

- a. Exterior of cabinet.
- b. Interior of cabinet.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine walls and partitions for thickness and framing for cabinets to verify cabinet depth and mounting prior to cabinet installation.
- B. Do not proceed until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Follow manufacturer's printed instructions for installation.
- B. Install in locations indicated. Each extinguisher requires a cabinet. Mount cabinet with bottom edge of trim located 32" above finished floor.
 - 1. Prepare recesses in walls for cabinets as required by type and size of cabinet and style of trim and to comply with manufacturer's instructions. Recesses in masonry walls shall be neatly sawcut.
 - 2. Fasten mounting brackets and cabinets to structure, square and plumb.

END OF SECTION 104415

SECTION 107500 – FLAGPOLES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Ground-set, fixed, cone tapered aluminum flagpoles with illuminated finial ball.

1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide flagpole assemblies capable of withstanding the effects of wind loads as determined according to the building code in effect for this Project or NAAMM FP 1001, "Guide Specifications for Design of Metal Flagpoles", whichever is more stringent.
 - 1. Flagged wind speed = 150 mph; 5' x 8' flag size.
- B. Base flagpole design on maximum standard-size flag suitable for use with pole or flag size indicated, whichever is more stringent.

1.4 SUBMITTALS

- A. Product Data: For each type of flagpole required. Include installation instructions.
- B. Shop Drawings: Show general layout, jointing, grounding method, and anchoring and supporting systems.
 - 1. Include detail of foundation system for ground-set poles and electrical wiring diagram for lighted finial.
- C. Structural Calculations: For flagpoles indicated to comply with certain design loadings, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain each flagpole as a complete unit from a single manufacturer, including fittings, accessories, bases, and anchorage devices. Illuminated finial and truck unit may be obtained from a separate manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. General: Spiral wrap flagpoles with heavy Kraft paper or other weather-tight wrapping and prepare for shipment in hard fiber tube or other protective container.
- B. Deliver flagpoles and accessories completely identified for installation procedure. Handle and store flagpoles to prevent damage or soiling.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Specifications are based upon products by The Flag Company, Inc. as distributed by The Flagpole Warehouse, Model ILH 30 “Illuminator Series”. Subject to compliance with specifications, comparable products by the following manufacturers are acceptable:
 - 1. American Flagpole; a Kearney-National Inc. Company.
 - 2. Baartol Company Inc. (The)
 - 3. Concord Industries, Inc.
 - 4. Eder Flag Manufacturing Company, Inc.
 - 5. Ewing International.
 - 6. Lingo Inc.; Acme Flagpole Division.
 - 7. Michigan Flagpole Inc.
 - 8. Morgan-Francis Div.; Original Tractor Cab Co., Inc.
 - 9. PLP Composite Technologies, Inc.
 - 10. Pole-Tech Company Inc.

2.2 FLAGPOLES

- A. Aluminum Flagpoles: Fabricate from seamless, extruded tubing complying with ASTM B 241, alloy 6063-T6, with a minimum wall thickness of 1/4 inch, tensile strength not less than 30,000 psi, and a yield point of 25,000 psi. Heat treat after fabrication.
 - 1. Provide cone-tapered aluminum flagpoles.
 - 2. Butt diameter: 6”; top diameter: 3-1/2”; exposed height: 30’-0”.

2.3 FLAGPOLE MOUNTING

- A. Provide manufacturer’s standard base system for the type of flagpole installation required.

- B. Foundation type: For ground-set flagpoles, provide 16-gage minimum galvanized corrugated steel tube, or 12-gage rolled steel tube, sized to suit flagpole and installation. Furnish complete with welded steel bottom base and support plate, lightning ground spike, and steel centering wedges, all welded construction. Provide loose hardwood wedges at top for plumbing pole after erection. Galvanize steel parts after assembly, including foundation tube.
 - 1. Provide manufacturer's standard flash collar, finished to match flagpole.

2.4 SHAFT FINISH

- A. General: Comply with NAAMM "Metal Finished Manual" for recommendations relative to application and designations of finishes.
- B. Aluminum: Finish designations prefixed by "AA" conform to the Aluminum Association system for designating aluminum finishes.
 - 1. Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 - a. Color and Gloss: As selected by Architect from manufacturer's full range.

2.5 FITTINGS

- A. Finial Ball: 8", gold anodized aluminum ball with two, 3 watt, LED bulbs.
 - 1. Provide transformer: 14 amps, with 12 volt output, 120 volt input, 60 Hz.
- B. Truck: Ball-bearing, nonfouling, revolving, single sheave assembly of cast aluminum finished to match pole shaft, integrated with illuminated finial ball.
- C. Cleats: Two 9-inch case metal cleats with fasteners, finished to match pole shaft.
- D. Halyards: Provide two continuous halyards for each flagpole, as follows:
 - 1. Polypropylene, braided, white: 5/16" diameter.
- E. Halyard Flag Snaps: Provide 2 swivel snap hooks per halyard, as follows:
 - 1. Chromium-plated bronze, with soft plastic covers.

PART 3 – EXECUTION

3.1 PREPARATION FOR GROUND-SET POLES

- A. Excavation: Excavate for foundation concrete to neat clean lines in undisturbed soil or thoroughly compacted fill. Provide forms where required due to unstable soil conditions. Remove wood, loose soil, rubbish, and other foreign matter from excavation, and moisten earth before placing concrete. Back fill open excavation after concreting with original excavated material.
- B. Concrete: Provide concrete composed of Portland cement, coarse and fine aggregate, and water mixed in proportions to attain 28-day compressive strength of not less than 3000 psi, complying with ASTM C 94.
- C. Place concrete immediately after mixing. Consolidate concrete in place by using vibrators. Moist-cure exposed concrete for not less than 7 days or use a nonstaining curing compound.
- D. Finish trowel exposed concrete surfaces to smooth, dense surface. Provide positive slope for water runoff to base perimeter.

3.2 FLAGPOLE INSTALLATION

- A. General: Prepare and install flagpoles where shown and in compliance with shop drawings and manufacturer's instructions.
 - 1. Provide positive lightning ground for each flagpole installation.
 - 2. Paint below-grade portions of ground-set flagpole with heavy coat of bituminous paint.
- B. Foundation-tube Installation: Install flagpole in foundation tube, seated on bottom plate between steel centering wedges. Plumb flagpole and install hardwood wedges to secure flagpole in place. Place and compact sand in foundation tube and remove hardwood wedges. Seal top of foundation tube with a 2-inch layer of elastomeric sealant and cover with flashing collar.
- C. Wiring for illuminated finial: Wire in accordance with manufacturer's directions. Low voltage wiring to be run concealed within pole. Locate transformer as indicated on electrical drawings.

END OF SECTION 107500

SECTION 113100 - RESIDENTIAL APPLIANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:

1. Refrigerator/Freezer
2. Dishwasher
3. Garbage Disposal
4. Ice Maker, Commercial
5. Electric Range
6. Clothes Washer
7. Clothes Dryer
8. Washer-Extractor

1.3 SUBMITTALS

- A. Product Data: For each appliance type required indicating compliance with requirements. Include complete operating and maintenance instructions for each appliance.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is an authorized representative of the residential appliance manufacturer for both installation and maintenance of appliances required for this Project.
- B. Source Limitations: Obtain residential appliances through one source.
 1. To the greatest extent possible, provide appliances by a single manufacturer for entire Project, unless noted otherwise in Residential Appliance Schedule.
- C. Electrical Appliances: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.
- D. UL and NEMA Compliance: Provide electrical components required as part of residential appliances that are listed and labeled by UL and that comply with applicable NEMA standards.

- E. AHAM Standards: Provide appliances that comply with the following AHAM standards:
 - 1. Refrigerators and Freezers: Total volume and shelf area ratings certified according to ANSI/AHAM HRF-1.
- F. Energy Ratings: Provide residential appliances that carry labels indicating energy-cost analysis (estimated annual operating costs) and efficiency information as required by the Federal Trade Commission.

1.5 DELIVERY

- A. Deliver appliances only after utility rough-in is complete and construction in the spaces to receive appliances is substantially complete and ready for installation.

1.6 WARRANTIES

- A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide one of the appliances indicated for each designation in the Residential Appliance Schedule at the end of Part 3.

2.2 FINISHES

- A. Porcelain-Enamel Finish: Provide manufacturer's standard factory-applied porcelain-enamel finish over cleaned and pretreated steel sheet except where stainless steel is indicated. If no color is indicated, provide white.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine roughing-in for plumbing, mechanical, and electrical services, with Installer present, to verify actual locations of services before residential appliance installation.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Comply with manufacturer's written instructions.
- B. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.
- C. Utilities: Refer to Divisions 22 and 26 for plumbing and electrical requirements.

3.3 ADJUSTING AND CLEANING

- A. Test each item of residential appliances to verify proper operation. Make necessary adjustments.
- B. Verify that accessories required have been furnished and installed.
- C. Remove packing material from residential appliances and leave units in clean condition, ready for operation.

3.4 RESIDENTIAL APPLIANCE SCHEDULE

- A. Refrigerator / Freezer: LG Model LFX5327265, 31.7 cubic foot capacity, French 3-door, Energy Star Qualified, stainless steel finish; ice maker and water dispenser in door.
- B. Dishwasher: Whirlpool Model WDF550SAAS, 5 cycles Tall Tub, Energy Star Qualified, Stainless Steel Interior, High Temperature Wash Option. Stainless steel finish.
- C. Garbage Disposal: Insinkerator "Evolution Essential", ¾ hp., single phase, 120 volt motor; 40-oz. grind chamber capacity.
- D. Ice Maker, Commercial: Scotsman Model C05030MR Cuber, Energy Star Qualified, M530S bin, ERC 111 Remote Condenser, RTE 75 Line Set.
- E. Electric Range: Verona Model VEFSEE365BU – 36" Electric Single Oven Range, burgundy with stainless steel trim and black ceramic glass cooktop, 5 sealed elements, convection oven, and adjustable stainless steel legs. Provide 8" extended backguard and EZ Glide Rolling Rack.
- F. Microwave Oven: Whirlpool Model WMC30516AS, 1.6 cu. ft., 1,200 watts, recessed glass turntable. Stainless steel finish.
- G. Clothes Washer: Whirlpool Model WTW8000DW, 5.3 cu.ft., stainless steel wash basket, 26 wash cycles, 3 spin speeds, Energy Star Qualified. White finish.
- H. Clothes Dryer: Whirlpool Model WED8000DW, 8.8 cu.ft., advanced moisture sensing system, wide-opening hamper door. White finish. Provide venting kit.

- I. Washer-Extractor: UniMac Model UWN045K1I, 45 lb. dry weight capacity, 7.21 cu.ft. wash cylinder volume, 5hp drive motor, Type 304 stainless steel construction on tubs and exposed surfaces, with soap box option; 208v, 60Hz, 3 phase.

END OF SECTION 113100

SECTION 122113 - HORIZONTAL LOUVER BLINDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes aluminum mini blinds for installation at all exterior windows.

1.3 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract.
- B. Product Data: Include printed data on physical characteristics, including slat metal thickness.
- C. Shop drawings showing location and extent of blinds. Show installation details at and relationship to adjoining work. Include elevations indicating blind units. Indicate location of blind controls.
- D. Samples for initial selection in the form of manufacturer's color deck of actual slats showing the full range of colors available.
- E. Maintenance data for horizontal louver blinds to include the following:
 - 1. Methods for maintaining horizontal louver blinds and finishes.
 - 2. Precautions for cleaning materials and methods that could be detrimental to finishes and performance.

1.4 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: Provide horizontal louver blinds identical to those tested for the following fire-test-response characteristics as determined by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Test Methods: NFPA 701.
 - 2. Rating: Pass.

1.5 PROJECT CONDITIONS

- A. Field Measurements: Check actual horizontal louver blind dimensions by accurate field measurements before fabrication, and show recorded measurements on final shop

drawings. Coordinate fabrication schedule with construction progress to avoid delaying the work.

- B. Space Enclosure and Environmental Limitations: Do not install horizontal louver blinds until space is enclosed and weatherproof, wet-work in space is completed and nominally dry, work above ceilings is complete, and ambient temperature and humidity conditions are and will be continuously maintained at values near those indicated for final occupancy.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Springs Window Fashions Division, Inc., "Bali S 3000".
 - 2. Hunter Douglas, Inc., "Lightlines" Blinds.
 - 3. Levolor Corp., "Mark 1" with Lightmaster feature.

2.2 HORIZONTAL LOUVER BLINDS

- A. Louvers: Manufacturer's 1" wide aluminum slats, unperforated:
 - 1. Privacy slat design for enhanced light control with hidden cord holes.
 - 2. Minimum Thickness: .008 inches
 - 3. Profile: crowned.
 - 4. Braided ladder spacing: 18.0mm
- B. Tilt Operation: Manual with wand.
 - 1. Length of Tilt Control: 3/4 length of blind.
 - 2. Position of Tilt Control: Left side, unless otherwise indicated.
 - 3. Tilt: Full.
- C. Cord-Lock Operation: Cord lock; locks pull cord to stop blind at any position in ascending or descending travel.
 - 1. Position of Cord Lock: Right side, unless otherwise indicated.
- D. Cord Equalizers: Self-aligning to maintain horizontal louver blind position.
- E. Valance: Match color of louvers.
- F. Headrail: 1" high x minimum 1-1/2" wide.
 - 1. Provide light-blocking lip at lower rear of headrail.

- G. Mounting: End at each single window. At windows 6 feet wide and larger, mounting shall be at ends and window opening head as required for installation of a pair of blinds at each window.
- H. Colors and Patterns: Where manufacturer's standard products are indicated, provide horizontal louvers complying with the following requirements.
 - 1. Provide Architect's selections from manufacturer's full range of colors.

2.3 FABRICATION

- A. Product Standard and Description: Comply with AWCMA Document 1029 for each horizontal louver blind unit consisting of louvers, rails, cord locks, tilting mechanisms, tapes, and installation hardware.
- B. Lifting and Tilting mechanism: Noncorrosive, self-lubricating materials.
- C. Unit Sizes: Obtain units fabricated in sizes to fill window and other openings as follows, measured at 74 degrees F.
 - 1. Blind Units Installed Between (Inside) Jambs: Width equal to 1/4 inch per side or 1/2 inch total, plus or minus 1/8 inch, less than jamb to jamb dimension of opening in which each blind is installed. Provide 1/2 inch clearance between each pair of blinds. Length equal to 1/4 inch, plus or minus 1/8 inch, less than head to sill dimension of opening in which each blind is installed.
- D. Installation Fasteners: Not less than 2 fasteners per bracket, fabricated from metal noncorrosive to blind hardware and adjoining construction; support blind units under conditions of normal use.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of horizontal louver blinds. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install blinds level, plumb, and located so exterior louver edges in any position are not closer than 1 inch to interior face of glass lites.
 - 1. Jamb Mounted: Install headrail flush with face of opening jamb and head.

3.3 ADJUSTING

- A. Adjust components and accessories for proper operation.

3.4 CLEANING

- A. Clean blind surfaces, according to manufacturer's instructions, after installation.
- B. Remove surplus materials, packaging, rubbish and debris resulting from installation. Leave installation areas neat, clean, and ready for use.

3.5 PROTECTION

- A. Provide final protection and maintain conditions in a manner acceptable to manufacturer and Installer that ensure that horizontal louver blinds are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 122113

SECTION 312000 – EARTH MOVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes earthwork, compaction, and grading of the Project site. This Section includes the following:
 - 1. Preparing and grading subgrades for building slabs-on-grade and pavement.
 - 2. Excavating and backfilling for buildings and structures.
 - 3. Excavating and backfilling trenches within building lines.
 - 4. Excavating and backfilling for underground mechanical and electrical utilities and appurtenances.
- B. Related Sections: The following Sections contain requirements that relate to this Section.
 - 1. Section 311000 – Clearing and Grubbing
 - 2. Section 329200 – Landscape and Sodding

1.3 DEFINITIONS

- A. Excavation consists of the removal of material encountered to subgrade elevations and the reuse or disposal of materials removed.
- B. Subgrade: The uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.
- C. Borrow: Soil material obtained off-site when sufficient approved soil material is not available from excavations.
- D. Unauthorized excavation consists of removing materials beyond indicated subgrade elevations or dimensions without direction by the Architect. Unauthorized excavation, as well as remedial work directed by the Architect, shall be at the Contractor's expense.
- E. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below ground surface.
- F. Utilities include on-site underground pipes, conduits, ducts, and cables, as well as underground services within building lines.

1.4 QUALITY ASSURANCE

- A. Codes and Standards: Perform earthwork complying with requirements of authorities having jurisdiction.
- B. Testing and Inspection Service: Contractor shall employ a qualified independent geotechnical engineering testing agency to classify and approve proposed on-site, sifted, and borrow soils, to verify that soils comply with specified requirements, to observe excavation and compaction work, and to perform required field and laboratory testing.

1.5 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt existing utilities serving facilities occupied by the Owner or others except when permitted in writing by the Architect and then only after acceptable temporary utility services have been provided.
 - 1. Provide a minimum 48-hours' notice to the Owner and receive written notice to proceed before interrupting any utility.
- B. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shutoff services if lines are active.
- C. Site Information: Data in geotechnical investigation report was used for the basis of the design. Report is available to the Contractor for information only. Conditions are not intended as representations or warranties of accuracy or continuity between soil borings. Neither the Owner nor the Architect will be responsible for interpretations or conclusions drawn from this data by the Contractor.
 - 1. Additional test borings and other exploratory operations may be performed by Contractor, at the Contractor's option; however, no change in the contract sum will be authorized for such additional exploration.
 - 2. Geotechnical Investigation: _____

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: Provide approved borrow soil materials from off-site when sufficient approved soil materials are not available from excavations.
- B. Satisfactory Soil Materials: ASTM D 2487 soil classification groups GW, GP, GM, SW, SP, and SM, or a combination of these group symbols; free of rock or gravel larger than 2 inches in any dimension within the upper 24" (not larger than 6" below 24" from surface), debris, waste, frozen materials, vegetation and other deleterious matter.
- C. Unsatisfactory Soil Materials: ASTM D 2487 soil classification groups GC, SC, ML, MH, CL, CH, OL, OH, and PT, or a combination of these group symbols.
- D. Backfill and Fill Materials: Suitable structural fill materials should consist of fine sand with less than 12 percent by dry weight of material passing the U.S. Standard No. 200 sieve size, and should be free of rubble, organics, clay, debris and other unsuitable material.
 - 1. Fill materials should be tested and approved prior to acquisition.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- B. Provide erosion control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.2 DEWATERING

- A. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
 - 1. The fine sands and slightly silty fine sands can be dewatered by installing a temporary well point or other suitable system to lower the groundwater table in the vicinity of the excavation while construction is underway.
 - a. The dewatering method shall be designed, constructed, and maintained by an experienced dewatering contractor.
- B. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.
- C. Dewatering shall allow for excavation in a drained condition suitable for compaction to specified requirements.

3.3 EXCAVATION

- A. Explosives: Do not use explosives.
- B. Unclassified Excavation: Excavation is unclassified and includes excavation to required subgrade elevations regardless of the character of materials and obstructions encountered.

3.4 STABILITY OF EXCAVATIONS

- A. Comply with local codes, ordinances, and requirements of authorities having jurisdiction to maintain stable excavations.

3.5 SITE CLEARING

- A. The development area plus a margin of five (5) feet should be stripped and cleared of surface vegetation and organic or root laden topsoil, grubbed of roots greater than 1/2" in diameter, and all building and pavement materials. Any topsoil removed from the structure and pavement areas should be stockpiled in designated locations and used in locations or areas to be grassed.

3.6 FILL PLACEMENT AND SUBGRADE PREPARATION

- A. Prior to construction, the location of any existing underground irrigation, septic tanks, drainage, or other utility lines within the construction area should be established. Underground pipes shall be properly removed.
- B. All vegetation, grass and roots shall be removed. As a minimum, the clearing and stripping operations shall extend to at least five feet beyond the development perimeter. Stripping of about 6 to 12 inches should be anticipated over the site in general.
- C. Compact the excavated building areas with overlapping passes of a large compactor (i.e. static weight of 20 tons). A vibratory roller is the preferred equipment for compaction. Compaction shall continue until a density of 95 percent of the Modified Proctor maximum density of the soil has been achieved to a depth of 1 foot below the compacted surface.
- D. All fill and backfill shall be placed in loose lifts not exceeding 12 inches in thickness. Each lift shall be compacted to a minimum of 95 percent of the Modified Proctor value of the soil. Prior to compaction, the moisture content of the soil shall be adjusted to facilitate proper compaction.
- E. Individual footing areas (i.e., excavations) should be recompacted with hand-held tampers (plate tampers or jumping jacks) to achieve 95 percent density (ASTM D-1557) for a minimum depth of 1 foot below footing bottom elevations.
- F. Compacted in-place soils should be acceptable for construction and support of a flexible (limerock, crushed concrete or shell base) or rigid (Portland cement) type pavement section after subgrade preparation. Any fill utilized to elevate the cleared pavement areas

to subgrade elevation should consist of clean to slightly silty fine sands (SP/SP-SM) uniformly compacted to a minimum density of 95 percent of the modified Proctor maximum dry density (ASTM D-1557) up to a level representing 24 inches below the pavement section.

- G. A representative from a qualified geotechnical engineering firm shall be retained to provide on-site observation of earthwork and ground modification activities. Density tests shall be performed in the top one foot of compacted existing ground, in each fill lift, and at the bottom of foundation excavations. It is important that the geotechnical engineer be retained to observe that the subsurface conditions are as discussed herein, and that foundation construction, ground modifications and fill placements are in accordance with these specifications.

3.7 EXCAVATION FOR TRENCHES

- A. Excavate trenches to indicated slopes, lines, depths, and invert elevations.
- B. All open-cut excavation areas should be properly dewatered for a period of at least 24 hours prior to the initiation of excavation operations. Following the proper dewatering operations, side slopes for temporary excavations may stand near 1½ horizontal to one vertical (1½ H:1V) for short dry periods of time to a maximum excavation depth of 4 feet. Where restrictions do not permit slopes to be constructed as recommended above, the excavation should be shored and braced in accordance with current OSHA requirements. Furthermore, open-cut excavations up to a maximum depth of 10 feet should be sloped to 3:1 (H:V) or flatter slopes or be braced using an approved bracing plan. During foundation construction, excavated materials should not be stockpiled at the top of any slope within a horizontal distance equal to the excavation depth.
- C. Excavate utility trenches to uniform widths to provide a working 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: 8 inches, minimum, each side of pipe or conduit.
- D. 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 stones and sharp objects to avoid point loading.
 - 1. For pipes or conduit less than 6 inches in nominal diameter and flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
 - 2. For pipes and conduit 6 inches or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe circumference. Fill depressions with tamped sand backfill.
 - 3. Where encountering rock or another unyielding bearing surface, carry trench excavation 6 inches below invert elevation to receive bedding course.

3.8 APPROVAL OF SUBGRADE

- A. Notify geotechnical engineer when excavations have reached required subgrade.
- B. When geotechnical engineer determines that unforeseen unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
- C. Reconstruct subgrades damaged by rain, accumulated water, or construction activities, as directed by the Architect or geotechnical engineer.

3.9 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending indicated bottom elevation of concrete foundation or footing to excavation bottom, without altering required top elevation. Lean concrete fill may be used to bring elevations to proper position when acceptable to the Architect.
 - 1. Fill unauthorized excavations under other construction as directed by the Architect.
- B. Where indicated widths of utility trenches are exceeded, provide stronger pipe, or special installation procedures, as required by the Architect.

3.10 STORAGE OF SOIL MATERIALS

- A. Stockpile excavated materials acceptable for backfill and fill soil materials, including acceptable borrow materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent wind-blown dust.
 - 1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.11 ON-SITE SOIL SUITABILITY

- A. All materials to be used for backfill or compacted fill construction shall be evaluated and tested by a qualified geotechnical engineer prior to placement to determine if they are suitable for the intended use. Suitable structural fill materials should consist of fine sand with less than 12 percent passing the No. 200 sieve, and be free of rubble, organics, clay, debris and other unsuitable material. Any off-site materials used as fill shall be approved by a qualified geotechnical engineer prior to acquisition.

3.12 BACKFILL

- A. Backfill excavations promptly, but not before completing the following:
 - 1. Surveying locations of underground utilities for record documents.
 - 2. Testing, inspecting, and approval of underground utilities.
 - 2. Concrete formwork removal.
 - 3. Removal of trash and debris from excavation.
 - 4. Removal of temporary shoring and bracing, and sheeting.

- B. Backfill soils placed adjacent to footings or walls shall be carefully compacted with a light rubber-tired roller or vibratory plate compactor to avoid damaging the footings or walls. Approved sand fills to provide foundation embedment constraint shall be placed in loose lifts not exceeding six (6) inches and shall be compacted to a minimum 95% of the Modified Proctor maximum dry density.

3.13 UTILITY TRENCH BACKFILL

- A. Place and compact bedding course on rock and other unyielding bearing surfaces and to fill unauthorized excavations. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- B. Concrete backfill trenches that carry below or pass under footings and that are excavated within 18 inches of footings. Place concrete to level of bottom of footings.
- C. Place and compact initial backfill of satisfactory soil material or subbase material, free of particles larger than 1 inch, to a height of 12 inches over the utility pipe or conduit.
 - 1. Carefully compact material under pipe haunches and bring backfill evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of utility system.
- D. Coordinate backfilling with utilities testing.
- E. Fill voids with approved backfill materials as shoring and bracing, and sheeting is removed.
- F. Place and compact final backfill of satisfactory soil material to final subgrade. Each lift shall be compacted to 95 percent of the Modified Proctor (ASTM D-1557) maximum dry density value.
- G. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.14 GRADING

- A. General: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
 - 1. Provide a smooth transition between existing adjacent grades and new grades.
 - 2. Cut out soft spots, fill low spots, and trim high spots to conform to required surface tolerances.
- B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
 - 1. Lawn or Unpaved Areas: Plus or minus 1 inch.
 - 2. Walks: Plus or minus ½ inch.
 - 3. Pavements: Plus or minus ½ inch.

- C. Grading Inside Building Lines: Finish subgrade to a tolerance of ½ inch when tested with a 10 foot straightedge.

3.15 FIELD QUALITY CONTROL

- A. Testing Agency Services: Allow geotechnical engineer to inspect and test each subgrade and each fill or backfill layer. Do not proceed until test results for previously completed work verify compliance with requirements.
 - 1. Inspect removal of unsuitable soils and buried debris.
 - 2. Perform field density in accordance with ASTM D 2937 or equal method as determined by geotechnical engineer.
 - 3. Pavement and Building Slab Subgrade: Make at least one field density test of subgrade for every 2,500 sq. ft. of building slab, but in no case less than 3 tests. In each compacted fill layer, make one field density test for every 2,500 sq. ft. of overlaying building slab or paved area, but in no case less than 3 tests per lift.
 - 4. Footing Subgrade and Pipe Trenches: Take at least 2 field density tests per 100 lineal feet in each compacted fill layer, and one field density test at each column footing in each compacted fill layer.
- B. If in opinion of Architect, based on testing service reports and inspection, subgrade or fills which have been placed are below specified density, provide additional compaction and testing at no additional expense to Owner.

3.16 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and re-establish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or lose compaction due to subsequent construction operations or weather conditions.
 - 1. Scarify or remove and replace material to depth directed by the Architect; reshape and recompact at optimum moisture content to the required density.
- C. Settling: Where settling occurs during the Project correction period, remove finished surfacing, backfill with additional approved material, compact, and reconstruct surfacing.
 - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

3.17 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off the Owner's property.

END OF SECTION 312000

SECTION 313116 – TERMITE CONTROL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Soil treatment with termiticide.

1.3 PERFORMANCE REQUIREMENTS

- A. Service Life of Soil Treatment: Soil treatment by use of a termiticide that is effective for not less than five years against infestation of subterranean termites.

1.4 SUBMITTALS

- A. Product Data: For termiticide.
 - 1. Include the EPA-Registered Label for termiticide products.
- B. Product Certificates: For termite control products, signed by product manufacturer.
- C. Qualification Data: For Installer of termite control products.
- D. Soil Treatment Application Report: After application of termiticide is completed, submit report for Owner's record information, including the following:
 - 1. Date and time of application.
 - 2. Moisture content of soil before application.
 - 3. Brand name and manufacturer of termiticide.
 - 4. Quantity of undiluted termiticide used.
 - 5. Dilutions, methods, volumes, and rates of application used.
 - 6. Areas of application.
 - 7. Water source for application.
- E. Warranty: Special warranty specified in this Section.

1.5 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.

- B. Regulatory Requirements: Formulate and apply termiticides according to the EPA-Registered Label.
- C. Source Limitations: Obtain termite control products through one source.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: To ensure penetration, do not treat soil that is water saturated or frozen. Do not treat soil while precipitation is occurring. Comply with requirements of the EPA-Registered Label and requirements of authorities having jurisdiction.

1.7 COORDINATION

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

1.8 WARRANTY

- A. 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.
- B. Products: Subject to compliance with requirements, provide products by one of the following:
 - 1. Termiticides:
 - a. BASF Corporation; Termidor.
 - b. Bayer Environmental Science; Premise 75.
 - c. FMC Corporation, Agricultural Products Group; Dagnet FT, Talstar, Prevail.

- d. Syngenta; Demon TC, Prelude, Probuild TC.
- 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 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for moisture content of soil, interfaces with earthwork, slab and foundation work, landscaping, and other conditions affecting performance of termite control.
 - 1. Proceed with application only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's written instructions for preparation before beginning application of termite control treatment. Remove all extraneous sources of wood cellulose and other edible materials such as wood debris, tree stumps and roots, stakes, formwork, and construction waste wood from soil within and around foundations.
- B. Soil Treatment Preparation: Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated. Loosen, rake, and level soil to be treated except previously compacted areas under slabs and footings. Termiticides may be applied before placing compacted fill under slabs if recommended 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.

3.3 APPLICATION, GENERAL

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

3.4 APPLYING SOIL TREATMENT

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

1. Slabs-on-Grade: 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, and around interior column footers, piers, and chimney bases; also 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.
- B. Avoid disturbance of treated soil after application. Keep off treated areas until completely dry.
- C. Protect termiticide solution, dispersed in treated soils and fills, from being diluted until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.
- D. Post warning signs in areas of application.
- E. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

END OF SECTION 313116

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SECTION 31-11-00 - CLEARING AND GRUBBING

PART 1 – GENERAL

1.01 DESCRIPTION OF WORK

WORK under this section of the specifications consists of complete removal and disposal of all vegetation, debris, drainage structures, flexible pavement, buildings or any other obstruction in all areas where excavation is to be done, or where embankments or structures will be constructed. This includes roadway area, ditch area, borrow and MATERIAL pits, and area where culverts or pipe lines will be constructed, and shall also consist of the adjustment to meet finished grade of all valve covers, access boxes, etc., within the limits of construction. The CONTRACTOR is expected to visit the site of the WORK and determine for himself the extent of the clearing and grubbing necessary for his construction operations.

1.02 RELATED STANDARDS

All clearing and grubbing shall be performed in accordance with the **Florida Department of Transportation (FDOT) Standard Specification for Road and Bridge Construction – Section 110 Clearing and Grubbing.**

1.03 PROJECT CONDITIONS

- A. Traffic: Conduct site clearing operations to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities. Do not close or obstruct streets, walks, or other occupied or used facilities without permission from authorities having jurisdiction.
- B. Protection of Existing Improvements: Provide protection necessary to prevent damage to existing improvements indicated to remain in place.
 - 1. Protect improvements on adjoining properties and on OWNER's property.
 - 2. Restore damaged improvements to their original condition, as acceptable to property OWNERS.
- C. Protection of Existing Trees and Vegetation: Protect existing trees and other vegetation indicated to remain in place, against unnecessary cutting, breaking, or skinning of roots, skinning and bruising of bark, smothering of trees by stockpiling construction MATERIALS or excavating MATERIALS within drip line, excess foot or vehicular traffic, or parking of vehicles within drip line. Provide temporary wood guards as indicated on the drawings to protect trees and vegetation to be left standing.
 - 1. Water trees and other vegetation to remain within limits of CONTRACT WORK as required to maintain their health during course of construction operations.
 - 2. Provide protection for roots over 1-1/2" diameter that is cut during construction operations. Coat cut faces with emulsified asphalt, or other acceptable coating, formulated for use on damages plant tissues. Temporarily cover exposed roots with wet burlap to prevent roots from drying out; cover with earth as soon as possible.

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3. Repair or replace trees and vegetation indicated to remain which are damaged by construction operations, in a manner acceptable to ENGINEER. Employ a licensed arborist to repair damages to trees and shrubs.

1.04 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. All waste MATERIALS, debris and/or unsuitable or excess topsoil resulting from site clearing shall become the property of the CONTRACTOR and it shall be the responsibility of the CONTRACTOR to dispose of all MATERIALS off the OWNER'S property in a legal manner in accordance with local code requirements.
- B. Burning is not permitted on OWNER'S Property unless specifically requested in writing and approved by the OWNER.
- C. Authorized Burning: Burning will be permitted only after written permission from OWNER and Governing Authority is received. Attend burning MATERIALS until fires have burned out or have been extinguished. Perform in manner prescribed by the permitting authority.

END OF SECTION 31-11-00

PASCO COUNTY FIRE & RESCUE STATION NO. 12

SECTION 31-23-01 – EARTHWORK - PROPOSED FOR EMBANKMENTS, ROADWAY/PARKING, DRAINAGE AND OPEN AREAS

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

The work covered under this section consists of excavating, removing, and satisfactorily disposing of all MATERIALS, of whatever character, within the limits of construction. Included in this section is all excavations, (borrow) embankments and grading necessary for the construction, preparation and completion of all onsite embankments, subgrades, shoulders, ditches, and slopes, all in accordance with the required PROJECT area grades, roadway alignment, grade and sections shown on the plans or as directed by the ENGINEER.

1.02 RELATED STANDARDS

All excavations and embankment shall meet or exceed those standards set forth in the **Florida Department of Transportation (FDOT) Standard Specification for Road and Bridge Construction – Section 120 Excavation and Embankment.**

PART 2 - MATERIALS

2.01 PRODUCTS

- A. General: Provide approved borrow soil MATERIAL from off-site when sufficient approved soil MATERIALS are not available from excavation.
- B. Satisfactory Soil MATERIALS under structures: **ASTM D2487** soil classification groups SP to SP-SM, Soils MATERIALS shall be inorganic soil of low plasticity, preferably clean sand containing less than 15 percent passing a No. 200 sieve.
- C. Unsuitable Soil MATERIALS under structures: **ASTM D2487** soil classification groups GC, SC, ML, MH, CL, CH, OL, OH, and PT.
- D. Backfill and Fill MATERIALS: Satisfactory soil MATERIALS free of clay, debris, waste, vegetable and other deleterious matter.
- E. Embankments: Satisfactory soil MATERIALS per the **FDOT Standard Specifications for Road and Bridge Construction – Section 120-7**

PART 3 - EXECUTION

3.01 REGULAR EXCAVATION

- A. Regular excavation is unclassified, and includes excavation to subgrade elevations indicated, regardless of character of MATERIALS and obstructions encountered. The CONTRACTOR shall perform all excavation necessary to accomplish the construction indicated on the plans. Wherever excavations are made below the grades indicated on the plans, firm MATERIAL shall be used to restore the area to the proper grade and compacted in accordance with these

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specifications. Where muck, rock, clay or other MATERIAL within the limits of excavation is, in the opinion of the ENGINEER, unsuitable in its original position, the CONTRACTOR shall excavate such MATERIAL and backfill with suitable MATERIAL which shall be shaped to conform to required section.

3.02 EXCAVATION BORROW

- A. Borrow excavation shall be the quantity of import fill in cubic yards needed for embankments which cannot be supplied through onsite Regular Excavation.
- B. The price and payment for Excavation Borrow include all borrow MATERIALs required, including all costs of furnishing borrow areas, of clearing and grubbing, and the removal of unsuitable MATERIALS of said borrow areas. Also included shall be all loading, hauling, and emplacement of fill MATERIALS.

3.03 EMBANKMENT

- A. This work shall consist of furnishing and placing the MATERIALS required for fill or embankment for the construction as indicated on the plan. The MATERIAL used for embankment shall consist of sand, gravel or a conglomerate thereof and/or other suitable MATERIAL approved by the ENGINEER. If the MATERIALS considered for use outside of structures and road development are of a variable quality, the CONTRACTOR shall plan his operation so that the upper two (2) feet of the embankment is constructed of selected MATERIALS as approved and directed by the ENGINEER.
- B. Prior to placing any embankment, the surface to receive the embankment shall be plowed or scarified. Fill or embankment shall be placed in successive uniform layers not more than twelve (12) inches measured loose. Each layer will then be compacted by an approved method in accordance with the procedure specified under Compaction.

3.04 BACKFILL

- A. All backfill MATERIAL shall be clean and free of all lumber, trash, or other debris, and shall be thoroughly compacted in layers not more than twelve (12) inches and brought to an elevation above the finished grade sufficient to provide settlement.
- B. Where clay (MATERIAL classified by ASTM D2487 as CH, CL, or SC) or rock is encountered, carry excavation 6" below required elevation and backfill with a 6" layer of sand, crushed stone or gravel prior to installation of pipe.
- C. Prior to backfilling, the areas around structures upon which backfill is to be placed shall be cleaned of all trash and debris of any description, unless directed by the ENGINEER to be left in place, such as sheeting and bracing.
- D. Backfill excavations promptly, but not before completing the following:
 - 1. Acceptance of construction below finished grade.
 - 2. Testing, inspecting, and approval of underground UTILITIES.
 - 3. Concrete formwork removal.
 - 4. Removal of trash and debris from excavation.

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5. Removal of temporary shoring and bracing, and sheeting.
6. Installing permanent or temporary horizontal bracing on horizontally supported walls.

3.05 GRADING

- A. General: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
 1. Provide a smooth transition between adjacent existing grades and new grades.
 2. Cut out soft spots, fill low spots, and trim high spots to conform to required surface tolerances.
- B. Grading for Roads: in final shaping of the surface of earthwork a tolerance of 0.3 foot above or below the plan cross-section will be allowed with the following exceptions:
 1. The surface of shoulders shall be shaped to within 0.1 foot of the Plan cross-section.
 2. Earthwork shall be shaped to match adjacent pavement, curb, sidewalk, structures, etc.
 3. Ditch bottoms shall be shaped so that no water will be impounded.
 4. Fill areas, as indicated on the Drawings, shall be sloped so as to drain in direction indicated without significant ponding.

3.06 COMPACTION

- A. Areas to be compacted shall be moistened and compacted by either rolling, tamping or any other method approved by the ENGINEER, in order to obtain the desired density. The ENGINEER shall inspect all compacted areas prior to further construction operations.
- B. Embankment adjacent to structures and under slabs for buildings and footings shall be compacted to a density of not less than 98% of the standard proctor maximum density as determined by ASTM D-698 or a density of not less than 95% of the modified proctor maximum density as determined by ASTM D-1557.
- C. Embankment for roadways, sidewalks, and slab-on-grade shall be compacted to a density of not less than 98% as determined by AASHTO T-180.
- D. All subgrades shall be compacted to a density of not less than 98% as determined by AASHTO T-180.

3.07 SUBGRADE

- A. When the WORK under this CONTRACT includes the construction of a base and/or surface course for roads, the subgrade WORK shall consist of bringing the bottom of excavations and the top of embankments within the area to be paved to a surface conforming to the grades, lines and cross-sections shown on the plans, of uniform required density ready to receive the base and/or paving course. All soft and yielding MATERIAL and other portions of the subgrade which will not compact readily shall be removed and replaced with suitable MATERIAL and the whole subgrade brought to line and grade and re-compacted.

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3.08 DREDGING AND FILL

Dredging for the production of fill MATERIAL shall be performed as a separate operation, and only to such depths as suitable MATERIAL is available. Fill MATERIAL shall be free of clay, muck, and as free of silt as possible. Adequate precautions will be taken to separate and use only suitable MATERIAL.

All dikes, embankments, conduits, or bulkheads needed for protection of adjacent areas, and confining or grading MATERIAL with waste weirs and ditches shall be provided and maintained by the CONTRACTOR. The fill indicated on the plans is to be constructed of MATERIALS dredged from within the excavation limits as shown on the plans, and all diking and incidental related WORK shall be completed in advance of the hydraulic fill operations.

Selected dredging shall be accomplished by carefully directed hydraulic fill methods, including the shifting and manipulation of the discharge to prevent ponding, formation of pockets of clay or silt, and forcing out of suspended clay, muck or silt along the wastewater. Fill MATERIAL shall be placed to drain freely as deposited. Ditching required to allow wastewater runoff shall be provided and maintained throughout the operation.

3.09 MAINTENANCE AND PROTECTION OF WORK

While construction is in progress, adequate drainage for the PROJECT area shall be maintained at all times. For areas of roadway construction, a shoulder at least three feet (3') wide shall be maintained adjacent to all pavement or base construction in order to provide support for the edges.

The CONTRACTOR shall maintain all earthwork construction throughout the life of the CONTRACT, unless otherwise provided, and shall take all reasonable precautions to prevent loss of MATERIAL from the PROJECT area due to the action of wind or water. He shall repair at his expense, except as otherwise provided herein, any slides, washouts, settlement, subsidence, or other mishap which may occur prior to final acceptance of the WORK.

All channels excavated as a part of the CONTRACT WORK shall be maintained against natural shoaling or other encroachments.

3.10 PROTECTION OF PERSONS AND PROPERTY

- A. Barricade open excavations occurring as part of this WORK and post with warning lights.
- B. Operate warning lights as recommended by authorities having jurisdiction.
- C. Protect structures, UTILITIES, sidewalks, pavements and other facilities from damage caused by settlement, lateral movement, under-mining, washout and other hazards created by earthwork operations.
- D. Perform excavation within drip-line of large trees to remain by hand, and protect the root system from damage or dry out to the greatest extent possible. Maintain moist condition for root system and cover exposed roots with burlap. Paint root cuts of 2" diameter and larger with emulsified asphalt tree paint.

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3.11 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. All waste MATERIALS, debris and/or unsuitable or excess topsoil resulting from site clearing shall become the property of the CONTRACTOR and it shall be the responsibility of the CONTRACTOR to dispose of all MATERIALS off the OWNER'S property in a legal manner in accordance with local code requirements.
- B. Burning is not permitted on OWNER'S Property unless specifically requested in writing and approved by the OWNER.
- C. Authorized Burning: Burning will be permitted only after written permission from OWNER and Governing Authority is received. Attend burning MATERIALS until fires have burned out or have been extinguished. Perform in manner prescribed by the permitting authority.

END OF SECTION 31-23-01

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SECTION 32-11-00 - BASE COURSE

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

The work covered under this section shall consist of the construction of a base course as indicated on the plans and specified herein. No work shall commence, on any portion of the roadway covered by this section until, the subgrade has been inspected and approved by the Engineer.

The contractor's testing company shall supply the engineer, through the contractor, a copy of all applicable test results. The testing company shall certify to the engineer of record, in writing, that all testing requirements, required by the local regulatory agencies, and the **Florida Department of Transportation (F.D.O.T.)**, for the improvements, as required by the drawings, are satisfied.

PART 2 - MATERIALS

2.01 LIMEROCK BASE

Limerock shell base, hereinafter called "base" or base-course, shall be constructed of local materials from approved sources. Base shall be of compacted thickness of not less than six (6) inches for limerock, unless otherwise called for on the plans, and in conformity with lines, grades and typical cross-sections shown on the plans. Construction shall be in accordance with the methods as given hereinafter in these specifications.

- A. Materials: Limerock material shall contain not more than one-half (1/2) of one (1) percent of organic matter and shall meet the following chemical requirements: Carbonates of calcium and magnesium - minimum 70%. All other constituents shall be Silica. The material gradation shall not be less than ninety-seven percent (97%) by weight of the material, which shall pass a 3-1/2" sieve and graded uniformly down to dust; the fine material shall consist entirely of dust of fracture. The maximum percentage of water-sensitive clay mineral shall be 3.
- B. The Owner will require that the source of supply of the lime-rock material proposed for use on this project be approved by him before starting the work.

Equipment: Mechanical rock spreaders capable of producing a uniform thickness and distribution shall be used.

Graders shall not be less than three (3) tone, with a blade not less than twelve (12) feet, and wheel base not less than fifteen (15) feet.

Rollers shall be of the power-three-wheeled type, weighing not less than ten (10) tons and shall have rear wheel compression not less than 350 pounds per lineal inch of tire width. Power-type shall be supplemented by sheepfoot or grid-type. Water shall be provided by the Contractor at the minimum rate of sixty (60) gallons per minute, measured at the nozzle at the site of work.

- C. Handling: Transportation of limerock shall be to point where it is to be used, over rock previously placed and dumped on the end of preceding spread. No hauling over or dumping on the prepared subgrade shall be permitted.

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- D. Spreading: Spreading shall be uniform and by hand, bulldozer, grader or other approved equipment. During dumping and spreading, the rock shall be thoroughly wetted; any segregated areas of fine or coarse rock shall be removed and replaced with well-graded rock. Layers up to six and one-half (6-1/2) inches shall be single course, and layers over six and one-half (6-1/2) inches shall be two equal courses.
- E. Compacting & Finishing Base: Compacting and finishing shall commence following the spreading. The rock shall be rolled with water being added as required until the entire depth of each layer of base is compacted into a dense unyielding mass. Compaction efforts shall continue until material is compacted at proper moisture content to a density of not less than ninety-eight percent (98%) of the maximum density as determined by **AASHTO T-180**. During final compacting operations, if blading of any area is necessary to obtain the grade and cross-section, compaction operations for this area shall be completed prior to any final density tests. If checks or cracks appear in the base (either before or after priming) and before the surface course is laid, they shall be removed at the discretion of the Engineer by rescarifying, reshaping, adding material as needed, and complete recompaction.
- F. Testing Surface: Testing base course surface shall be done prior to priming and shall be done by the use of a fifteen foot straightedge laid parallel with the centerline and a template cut to the true cross-section laid perpendicular to the centerline. All irregularities greater than one-quarter (1/4) inch shall be corrected by scarifying to a depth of at least four (4) inches, and then removing or adding rock as necessary after which the entire area shall be watered, rolled and brought to satisfactory compaction.
- G. Priming and Maintaining: The prime coat shall be applied only when the base meets the specified density requirements and the moisture content does not exceed ninety percent (90%) of the optimum moisture for the base material.

The Contractor shall be responsible for assuring that a true cross-section is maintained and that the base meets all requirements at the time the surface course is applied.

2.02 REWORKING LIMEROCK BASE

- A. Materials and equipment shall conform to the requirements specified under Materials and equipment shall conform to the requirements specified under **Florida Department of Transportation "Standard Specifications for Road and Bridge Construction", Section 2.10.**
- B. Existing Bituminous Surfaces: All asphalt concrete surfaces shall be removed and disposed of prior to scarifying or trenching. Bituminous surfaces may be mixed in with existing limerock unless otherwise indicated on plans.
- C. Trenches and Subgrade: Trenches for widening shall be excavated prior to scarifying and the subgrade prepared by shaping and compacting as required by plan and/or specification.
- D. Spreading, Shaping and Compacting: Existing base shall be scarified and disked to the extent that there shall be no pieces larger than three and one-half (3-1/2) inches bonded together. The material shall then be spread to the full width of cross-section, rolled and compacted to the required density specified for Limerock Base.

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2.03 PRIME COAT

Work specified herein shall consist of furnishing and applying bituminous material to be used on the prepared base course.

- A. Material: The bituminous material to be used for the prime coat shall be cut-back asphalt of the following grades or as designated by the Engineer: **Grade AE 200**.
- B. Application Rate: The rate of application shall be, unless otherwise ordered by the Engineer:

Limerock Base - Not less than 0.10 Gal. per square yard

- C. Application of Bituminous Material: The prime coat shall not be applied until the base has been satisfactorily prepared by cleaning to remove all loose dust, dirt, clay and other objectionable materials. Cleaning will be by "hard-blading" and brooming. If deemed necessary, the Engineer may require the base to be sprinkled with water immediately in advance of the application of prime.

Priming shall be performed with a pressure distributor equipped with pneumatic tires that will not break or rut the base, and is capable of providing a uniform distribution. Following the application of the prime coat, the Contractor shall apply a sand-bituminous hot mix over the primed surface and roll with a traffic roller. This mix shall consist of approximately ten (10) pounds of clean sand or screenings per square yard, mixed with two (2) to four (4) percent of asphalt cement, penetration grade 60-70 or 85-100.

- D. Weather Limitations: Unsuitable conditions as determined by the Engineer.

2.04 TACK COAT

Work shall consist of applying the tack coat to the prepared rock base, prior to placing the surface course.

- A. Material: The material to be used for the tack coat shall be emulsified asphalt, Grade RS-2, SS-1 or SS-H, conforming with the requirements of **AASHTO M-140 and M-208**.
- B. Application Rate: The rate of application of the tack coat shall be between 0.02 and 0.10 gallons per square yard, the exact rate being designated by the Engineer.
- C. Application of Bituminous Material: In general, a tack coat will not be required on primed bases except in areas which have become excessively dirty, or where the prime has cured and lost all bonding effect.

Where required, the tack coat shall be applied with a pressure distributor or an approved mechanical method, or by hand as approved by the Engineer. The material shall be heated to a suitable consistency as designated by the Engineer, and applied in a thin, uniform layer.

Following the application, the surface shall be allowed to cure without being disturbed for such period of time as may be necessary to permit the necessary dryout of the tack coat. The surface shall be maintained by the Contractor, free of traffic, until the wearing surface has been laid.

END OF SECTION 32-11-00

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SECTION 32-11-16 – SUBGRADE STABILIZATION

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. The work specified in this Section consists of the construction of the portion of the roadbed required by the plans to be stabilized, to the bearing values specified by the plans and the uniformity and density specified herein, and having a firm and unyielding subgrade. The work shall be constructed in accordance with these Specifications and in accordance with the lines, grades, thickness and notes shown in the plans. The method for determining compliance with the bearing value requirements will be the Limerock Bearing Ratio Method or Florida Bearing Value.
- B. The contractor's testing company shall supply the engineer, through the contractor, a copy of all applicable test results. The testing company shall certify to the engineer of record, in writing, that all testing requirements are satisfied, as required by the **Local Regulatory Agencies** and the **Florida Department of Transportation (F.D.O.T.)** for the improvements shown in the drawings.

PART 2 - MATERIALS

2.01 GENERAL

- A. Unless otherwise indicated, the materials to be used as Stabilizing Additives shall be either local materials or commercial materials meeting the requirements designated for each such type in Florida State Road Department "**Standard Specifications for Road & Bridge Construction**", **Section 160**.
- B. Source of supply of material used for subgrade stabilization shall be approved by the Engineer prior to construction.

PART 3 - EXECUTION

3.01 GENERAL

- A. The Contractor shall be responsible for obtaining the specified value with no direct payment for any stabilizing material.
- B. After the roadbed grading operations have been substantially completed, the contractor shall determine if any additive stabilizing material is required; and, if so, he shall select the particular type and establish the quantity required to bring the roadbed to the specified value. The Contractor shall determine such quantity by tests made on the roadbed material and the particular stabilizing material he intends to use. The stabilizing material used shall be any of the types specified in **Part 2**. The Contractor shall notify the Engineer of the approximate quantities of stabilizing materials to be added, and the Engineer shall assure that the material is spread uniformly over the intended areas and is properly mixed-in. No additive stabilizing material will be required where the roadbed materials have an LBR value equal to or greater than the design value.

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3.02 CONSTRUCTION METHODS

Prior to the addition of any stabilizing materials, the roadbed shall have been constructed to an elevation which will provide a roadbed surface conforming to the plans and Specifications upon completion of the stabilizing. The mixing requirements apply to each course, whether or not stabilizing materials are added.

The stabilizing shall be done in either one or two courses, subject to the provisions herein.

- A. Special Requirements: Where the roadbed material meets the design LBR value; in any areas where the value of the existing roadbed material (after the roadbed grading is substantially completed) is equal to or exceeds the design value, the work of stabilizing shall consist only of the mixing, shaping and compacting operations specified herein, and the work necessary to comply with the requirements as specified.
- B. Where Stabilizing Material is Required Only in the Top Six Inches of the Roadbed: In this case, stabilization shall be accomplished as specified, except that either local or commercial stabilizing material may be used, and the stabilizing may be done in one operation, provided that the values called for by the typical section are obtained in the respective zones.
- C. Mixing: For each course of the stabilization, the roadbed materials and any additive stabilizing materials shall be thoroughly mixed or mixed-in with rotary tillers, or other equipment, approved by the Engineer, until the mixed materials are of uniform texture and bearing capacity throughout the width and depth of the course being processed.
- D. Size Limitation After Completion of Stabilizing: Regardless of the character of the mixed materials or the LBR value obtained, any material in a completed stabilized area which will not pass a 3-1/2 inch ring shall be removed or shall be broken down to meet such requirement.
- E. Use of Existing Base Material: When called for in the plans, material from the existing base shall be utilized in the roadbed as stabilizing material. The existing base material shall be spread uniformly over the designated roadbed area after the grading operations and prior to the testing of the roadbed to determine the quantity of any additional stabilizing material to be added. If any additional stabilizing material is required, the existing base material and the hauled-in stabilizing material may be mixed with the roadbed material in one operation.

No separate measurement or payment will be made for the volume of existing base material incorporated in the roadbed. All costs of performing the work required by this sub-article and not included in the regular grading required by the plans for the roadway construction shall be included in the contract unit price for the area of stabilizing.

- F. Condition of Completed Subgrade: After the stabilizing and compacting operations have been completed, the subgrade shall be firm and unyielding to the extent that it will support construction equipment without undue distortion and have the LBR value as dictated in the Construction Drawings

3.03 TOLERANCE IN LBR VALUE

- A. Tolerance values in this Article shall not be applicable prior to the mixing operation. Where the required LBR value is forty, an undertolerance of 5.0 will be permitted. Where the required value is

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thirty-five, an undertolerance of 4.0 will be permitted. Where the required value is thirty, an undertolerance of 2.5 will be permitted.

3.04 RE-MIXING

- A. For any area where the LBR obtained is deficient by more than the allowed tolerance, additional stabilizer shall be added and remixing done throughout the area in which such deficiency is indicated. For Type B Stabilization, the requirements as specified shall apply. For any deficient area, re-mixing shall be done for a distance of at least 50 feet in each longitudinal direction beyond the edge of the deficient area.

3.05 COMPACTION

- A. After the mixing operations have been completed and all requirements for bearing value, uniformity, etc., have been met to the satisfaction of the Engineer, all portions of this work shall be compacted in accordance with the requirements as specified for areas which are to be grassed.

3.06 MAINTENANCE OF SUBGRADE

- A. After the subgrade has been prepared as specified, the Contractor shall maintain it free from ruts, depressions and any damage. It shall be the Contractor's responsibility to maintain the required density until final acceptance of the project. Responsibility shall include any repairs, or replacement of curbs, gutters, and sidewalks and all appurtenances which might become necessary in order to repair the subgrade in the event of washout or other damage occurring to the previously contracted subgrade. Any such work required for repair shall be at the contractor's expense. Ditches and drains shall be constructed and maintained along the completed subgrade section.

END OF SECTION 32-11-16

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SECTION 32-12-13 - ASPHALT SURFACE COURSE

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

The WORK specified herein shall consist of the construction of a compacted asphalt surface course, the thickness to be designated on plan, on a fully prepared base course. The requirements for plant and EQUIPMENT and general construction requirements shall conform to **Sections 320 and 330 respectively of the Florida Department of Transportation Standard Specifications**. The completed pavement shall have the required stability and texture acceptable to the ENGINEER. It shall consist of a mixture of aggregates, mineral fillers, and asphalt cement, properly laid on the prepared base and in conformity with the lines and grades as designated on the plans, or as ordered by the ENGINEER. No WORK shall commence, on any portion of the roadway covered by this Section, until the Base Course has been inspected and approved by the ENGINEER.

The CONTRACTOR'S testing company shall supply the ENGINEER, through the CONTRACTOR, a copy of all applicable test results. The testing company shall certify to the ENGINEER of record, in writing, that all testing requirements, required by the local regulatory agencies, and the Florida Department of Transportation (F.D.O.T.), for the improvements, as required by the ENGINEERING construction drawings, are satisfied.

PART 2 - MATERIALS

2.01 ASPHALTING CONCRETE SURFACE COURSE

- A. The MATERIALS used shall conform to the Florida Department of Transportation "**Standard Specifications for Road & Bridge Construction**", Latest Edition.
1. Aggregate: All aggregate MATERIAL shall be furnished by the CONTRACTOR. The aggregate shall contain no appreciable amount of phosphate, and shall consist of either crushed stone or crushed gravel. Any combination of these aggregates with sand that will meet the gradation and stability requirements specified may be used.
 2. Fine Aggregate and Mineral Filler: In laboratory tests and for the purpose of proportioning the paving mixture, all MATERIALS passing the No. 10 sieve and retained on the No. 200 sieve shall be considered as fine aggregate, and the mineral passing the No. 200 sieve shall be considered as mineral filler.
 3. Screenings: Any screenings used in the combination of aggregates shall contain no more than 15% of MATERIAL passing the No. 200 sieve. When two screenings are blended to produce the screening component of the aggregate, one of these may contain up to 18% of MATERIAL passing the No. 200 sieve, as long as the combination does not contain over 15% MATERIAL passing the No. 200 sieve. Screenings may be washed to meet these requirements.
 4. Coarse Aggregate: The design mix shall be based on the use of Grade 16S Coarse Aggregate. If, however, after the design has been established, aggregate shipped to the job fails to meet the foregoing gradation requirements yet such aggregate, when blended with other aggregates for the mix will produce an aggregate combination falling within the design gradation tolerances, the aggregate will be acceptable on this basis. No variation from the maximum size will be permitted.

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PART 3 - EXECUTION

3.01 MIX FORMULA

The mix formula shall be in accordance with **F.D.O.T. Specifications**.

No WORK shall be started until the CONTRACTOR has received approval of all the MATERIALS and job mix formula from the ENGINEER. The CONTRACTOR shall submit samples of the MATERIAL intended for use to a recognized testing laboratory for establishment of a job mix formula, and a copy of this formula shall then be sent to the ENGINEER. The ENGINEER may request additional samples during the course of construction.

Stability of Mix: The constituents of the mixture shall be combined such proportions as to produce a mixture having at least 1,600 pounds stability, as determined by the Hubbard-Field Stability Test. If mixture is found to be deficient, no payment will be made for replacement of the mixture and restoration of the base.

3.02 PLANT AND EQUIPMENT

The requirements for the plant and EQUIPMENT shall conform to **F.D.O.T. Specification - Section 320**.

3.03 CONSTRUCTION

Preparation of asphalt cement, aggregates and mixture shall conform to **F.D.O.T. Specification - Section 330**.

- A. Limits of Spreading: The asphaltic mixture shall be spread only when the surface has been previously prepared, is intact, firm, properly cured, is not and has not been frozen in the immediate preceding 24 hours, is dry, with no moisture remaining in cracks to be overlaid, and, unless otherwise directed, only when the air temperature (the temperature in the shade away from artificial heat) has been above 30°F, for at least 24 hours prior to the time of spreading. During cold weather when the temperature drops below 40°F, if any freezing has been evidenced within the immediate preceding 24 hours, the mix shall not be laid when the air temperature is below 60°F. When the temperature has not been below or near freezing for a period of 24 hours and all other conditions are considered suitable, the ENGINEER may allow the laying of the mixture when the air temperature is above 40°F. The mixture shall be spread only when, in the ENGINEER'S opinion, all conditions are suitable, including those stipulated above. No mixture shall be spread that cannot be finished and compacted during daylight hours.
- B. Application Surfaces: Prior to the laying of the mixture, the surface of the base or pavement to be covered shall be cleaned of all loose and deleterious MATERIAL by the use of power brooms and/or blowers, supplemented by hand brooming where necessary. A tack coat shall be required when so directed by the ENGINEER.
 1. Patching and Leveling Courses: Where a surface course on an existing pavement or old base which is irregular, and wherever so indicated on the plans, the existing surface shall be brought to proper grade and cross-section by the application of patching or leveling courses.
 2. Over Surface Treatment: Where a surface course is to be placed over a newly constructed surface treatment, all loose MATERIALS shall be swept from the surface.

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3. Contracting Structures: All structures which will be in direct contact with the asphalt, except pavements and curb and gutter, shall be uniformly coated with asphalt cement.
4. Tack Coat: Will require on the following surfaces:
 - a. Between successive surface courses
 - b. Between successive leveling courses
 - c. Between leveling and surface courses
 - d. On old pavements to be patched or leveled

C. Placing the Asphaltic Mixture:

1. Alignment of Edges: All asphaltic concrete mixtures laid without curb and gutter sections shall be laid by stringline to assure the maintenance of an accurate, uniform alignment of the pavement edge.
2. Temperature When Spread: The temperature of the mixture at the time of spreading shall be between 270°F. and 350°F.
3. Rain and Surface Conditions: Any mixture caught in transit by a sudden rain may be laid at the CONTRACTOR'S risk. Should such mixture prove unsatisfactory it shall be removed and replaced with satisfactory mixture at the CONTRACTOR'S expense. In no case shall the mixture be laid while rain is falling or when there is water on the surface to be covered.
4. Intersections: Intersections may be paved either before or after the straight run of paving.
5. Checking Depth of Layer: The depth of each layer shall be gauged at suitable intervals, not to exceed 25 feet. Where the layer being spread is to be used as the wearing surface, it shall also be checked at frequent intervals, as directed by the ENGINEER, by means of a template cut to proper crown and section, allowing sufficient depth for compaction. Any deviation from the required thickness, or from standard crown and section as indicated by the template, shall be immediately remedied.
6. Hand Spreading: In limited areas where because of irregularities or unavoidable obstacles, the use of mechanical spreading and finishing EQUIPMENT is impractical, the mixture may be spread by hand, if so authorized by the ENGINEER.
7. Machine Spreading: All machine laid courses will be laid with a spreader/paver equipped with an automatic screed control of the ski or traveling stringline type. The automatic joint matcher shall be used on top course after the first pass has been laid.
8. Straight edging and Back-patching: Straight edging and back-patching shall be done after initial compaction has been obtained and while the MATERIAL is still hot.
9. Moisture Condition of Base: At the time of placing the surface course on the underlying base course, the moisture content of the base course shall not exceed 90 percent of optimum.

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D. Compaction:

1. Compacting EQUIPMENT, speed, number, etc., shall conform to **F.D.O.T. Specification 330-10**.
2. Rolling Procedures: The initial rolling shall be longitudinal. Where the lane being placed is adjacent to a previously placed lane the center joint shall be pinched or rolled prior to the rolling of the rest of the lane.

After the rolling of the center joint, the rolling shall resume at the outer edge or low side of the road and shall progress toward the center, or high side, overlapping each previous roller path by at least one-half of the width of the roller wheel.

The motion of the roller shall at all times be slow enough to avoid displacement of the mixture, and any displacement shall at once be corrected by the use of rakes and by adding fresh mixture if required.

3. Compaction of Areas Inaccessible to Roller: Areas which are inaccessible to a roller (such as areas adjacent to curbs, headers, gutters, bridges, manholes, etc.) shall be compacted by the use of hand tamps.
4. Correcting Defects: Gasoline or oil from rollers shall not be allowed to deposit on the pavement and any areas damaged by such deposits shall be removed and replaced as directed by the ENGINEER. While rolling is in progress the surface shall be tested continuously and all discrepancies corrected to comply with the surface requirements. All drippings, fat and lean areas, and defective construction of any description shall be removed and replaced. Depressions which develop before the completion of the rolling shall be remedied by loosening the mixtures and adding new mixture to bring the depression to a true surface. Should any depressions remain after the final compaction has been obtained, the full depth of the mixture shall be removed and replaced with sufficient new mixture to form a true and even surface. All high spots, high joints and honeycombs shall be corrected as directed by the ENGINEER. Any mixture which becomes loose or broken, mixed or coated with dirt or in any way defective prior to laying the wearing course shall be removed and replaced with fresh mixture which shall be immediately compacted to conform with the surrounding area. Areas of defective surface may be repaired by the use of indirect (infra-red) heat. No method of repair involving open flame heater shall be used.

E. Joints:

1. Transverse: Placing of the mixture shall be as nearly continuous as possible and the roller shall not pass over the unprotected end of the freshly laid mixture except when the laying operation is to be discontinued long enough to permit the mixture to become chilled. When the laying operation is thus interrupted transverse joints shall be formed by laying a board, of a thickness equal to the compacted thickness of the pavement, across the width of the strip being spread, and rolling the mixture against the board.
2. Longitudinal: Where only a portion of the pavement width is to be laid and opened to traffic, the joint shall be formed by rolling the exposed edge. When the adjacent strip is constructed, this edge shall be trimmed back to expose an unsealed edge or granular vertical surface. Where

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the first strip is closed to traffic, the edge shall not be sealed but left vertical and the adjacent strip placed against it without trimming.

3. Where a fresh mixture is laid against a joint, it shall be placed in close contact with the exposed surface so that a well compacted joint will be produced after rolling.

F. Surface Requirements:

1. **Checking with Rolling Straightedge:** All asphaltic surfaces shall be checked by the rolling straight edge in accordance with the following provisions: As soon as the rolling has been completed and the surface has hardened sufficiently to be walked on, the entire surface shall be checked with a rolling straightedge set to indicate any surface irregularities in excess of 3/16 inch. The rolling straightedge shall have an effective length of 15 feet, and its design shall meet the approval of the ENGINEER. The rolling straightedge and labor for its operation shall be supplied by the CONTRACTOR. The straightedge shall be applied in lines parallel to the centerline at not greater than 36-inch centers. Straight edging shall be extended across any joints. Any irregularities in excess of 3/16 inch shall be corrected by removing and replacing the defective sections or by overlaying with surface MATERIALS, as directed by the ENGINEER.
2. **Manual Straightedge and Template:** A 15-foot manual straightedge and a standard template cut to the true cross-section of the road shall be furnished by the CONTRACTOR and shall at all times be available on the WORK. The straightedge shall be of a design which indicates variations as small as 1/4 inch. The CONTRACTOR shall designate an employee whose duty it is to handle the straightedge and template in checking the compacted surfaces, under the direction of the ENGINEER.
3. **Permissible Variations from True Surface:** The finished surface shall not vary more than 1/4 inch from the template cut to the cross-section of the road, nor more than 3/16 inch from the straightedge applied parallel to the centerline of the pavement. Any surface irregularities exceeding the above limits shall be corrected.
4. **Texture of Finished Surface:** The finished surface shall be of a uniform texture and of uniform compaction. The surface shall have no pulled, torn or loosened portions, and shall be free of any sand streaks, sand spots or ripples. These requirements shall also apply to any areas where it is necessary to apply hand WORK.

Any areas in which the surface does not meet the above requirements shall be corrected at the CONTRACTOR'S expense. Such corrections may be made either by replacing of the surface course (to full depth) or by overlaying with the type of asphaltic concrete mixture being placed. Such corrections shall be made for the full width of the machine being used in such defective area and to the lengths each side of the defective areas as follows:

The correction shall be made by replacing of the full thickness it shall extend to at least 50 feet each side of the defective area. The overlaying shall be constructed according to the specific instructions of the ENGINEER. The costs of correcting the defective pavement shall be borne by the CONTRACTOR.

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5. Final Surface Check: Prior to final acceptance, the surface courses specified to be checked by the rolling straightedge shall be subject to a check inspection by the same procedure.
- G. Protection of Finished Surface: Shoulders shall not be constructed until after completion of the final surface. When blade graders are operating adjacent to the pavement during shoulder construction they shall have a two-inch by eight-inch board bolted to their blades in such manner that it extends below the blade edge, in order to protect the pavement surface from damage by the grader blade. Vehicular traffic shall not be permitted on any pavement which has not set sufficiently to prevent rutting or other distortion.
- H. Calculation of Thickness:

Core Borings: The thickness of the pavement shall be determined from the length of two-inch diameter cores, taken at random points on the cross-section and at linear intervals not greater than 500 feet. The average thickness shall be determined from the thicknesses thus indicated, and in accordance with the procedure and criteria specified herein.

Areas of deficient thickness pavement which are left in place with no compensation therefor shall not be taken into account in the calculations.

Where areas of defective surface or deficient thickness are corrected by overlaying with additional MATERIAL, the thickness used in the calculations shall be the specified thickness for such areas.

END OF SECTION 32-12-13

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SECTION 32-16-23 - CONCRETE PAVING & WALKS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. The Bidding Requirements of the General Conditions, Supplementary General Conditions, and Division One Apply to all WORK hereunder.

1.02 DESCRIPTION OF WORK

- A. Provide concrete walks, accessories and related WORK as indicated on the drawings and specified herein.
- B. Related WORK specified elsewhere:
 1. Subgrade soil shall be graded and compacted in conformance with **Section 31-23-01 – Earthwork Proposed for Embankments, Roadway/Parking, Drainage and Open Areas.**
 2. Except as specifically indicated herein, MATERIALS and installation of concrete, curing methods and MATERIALS and expansion joint MATERIAL shall conform to **Section 03-30-00 – Concrete.**
 3. Except as specifically indicated herein, MATERIALS and installation of reinforcing steel and wire fabric reinforcing shall conform to **Section 03-20-00 - Reinforcing**

PART 2 - EXECUTION

2.01 INSTALLATION

- A. Concrete paving shall be one-course construction, four inches (4") or six inches (6") in thickness and thickened at the edges as indicated on the drawings. Paving shall be reinforced with fiber mesh, wire fabric and/or steel reinforcing as indicated on the drawings.
- B. Joint Construction:
 1. General: construct joints true o line with faces perpendicular to surface plan of concrete.
 2. Construction Joints: Locate and install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect/ENGINEER.
 3. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness, as follows:
 - i. Control joints shall be hand-tooled after initial floating by grooving and finishing each edge of joint with a groover tool to radius of ¼ inch. Repeat grooving of contraction joint after applying surface finishes. Eliminate groover marks on concrete surfaces.

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- ii. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- C. Isolation Joints: Install joint-filler strips at junctions with slabs-on-grade and vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
 1. Extend joint fillers full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.
- D. Finish Grades:
 1. All surfaces shall be sloped to provide positive drainage.
 2. Grades not otherwise indicated shall be uniform slopes between finish grades indicated on the drawings and/or existing grades.
 3. All transitions shall be rounded.
 4. Slope finish surfaces away from building walls.
 5. New and existing surfaces shall match elevation without abrupt changes of level except at curbs and steps specifically indicated.
- E. Concrete Finish:
 1. Paving and walks shall receive the following sequence of finishing operations:
 - a. Screed and float concrete to true proper level with maximum one-eighth inch (1/8") per six inch (6") tolerance
 - b. WORK concrete with wood float, followed by light steel troweling.
 - c. Hand tool joints and slab edges with one-fourth inch (1/4") radius.
 - d. Provide light to medium broom finish.

END OF SECTION 32-16-23

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SECTION 32-17-23 - PAINTED TRAFFIC STRIPES

1.0 DESCRIPTION OF WORK

The WORK covered under this section shall consist of furnishing all labor, EQUIPMENT and MATERIALS necessary to complete the painted traffic stripping as indicated on plans.

2.0 DESCRIPTION

All WORK shall conform to the latest edition of the **F.D.O.T. Standard Specifications for Road and Bridge Construction" - Section 710 Painting Traffic Stripes"** and the **Manual on Uniform Traffic Control Devices.**

END OF SECTION 32-17-23

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SECTION 32-17-24 - THERMOPLASTIC TRAFFIC STRIPES AND MARKINGS

1.0 DESCRIPTION OF WORK

The WORK covered under this Section shall consist of furnishing all labor, EQUIPMENT and MATERIALS necessary to complete the thermo-plastic traffic stripes and markings as indicated on the plans.

2.0 DESCRIPTION

All WORK shall conform to the latest editions of the **F.D.O.T. Standard Specifications for Road and Bridge Construction - "Section 711 Thermoplastic Traffic Stripes and Markings"** and the **Manual on Uniform Traffic Control Devices**.

END OF SECTION 32-17-24

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SECTION 32-31-13 - CHAIN LINK FENCE AND GATES

PART I - GENERAL

1.01 SCOPE OF WORK

The WORK covered under this Section shall consist of the furnishing of all labor, EQUIPMENT, and MATERIALS, and performing all operations necessary for the erection of chain link fence and gates, all in accordance with these specifications and the applicable plans.

1.02 REFERENCE STANDARDS

- A. Specification of Metallic-Coated and Polyvinyl Chloride (PVC) Coated Steel Chain Link Fence Fabric, published by **Chain Link Fence Manufacturers Institute**, Washington, D.C. 20036.
- B. All MATERIALS shall meet the requirements of **AASHTO and ASTM** as indicated herein.

1.03 SUBMITTALS

- A. Shop Drawings: Layout of fence and gates with dimensions, details of post installation and finishes of component accessories and post foundations.
- B. Product Data: Manufacturer's catalogue cuts indicating MATERIAL compliance and specified options.

Like items of MATERIALS provided hereunder shall be the end products of one manufacturer in order to achieve standardization for appearance, maintenance, and replacement.

PART 2 - PRODUCTS

2.01 MATERIALS

All MATERIAL shall be of an approved type and quality.

2.02 FABRIC

The fabric shall be No. 9 gauge (unless shown otherwise in the Fence Details of the related plans) U.S. Standard steel, woven into two inch (2") mesh, with top and bottom selvages either knuckled or barbed, as indicated on plans and/or specifications. The fabric shall be zinc coated steel, coated at a rate of 1.8 ounce per square foot meeting the requirements of **ASTM M181, Type I**.

2.03 POSTS

All posts shall be galvanized steel pipe set in concrete footings, as specified below and/or as shown on plans.

Line posts shall be 2-1/2" O.D., **ASTM A53, Table 2, ASTM F1083 and AASHTO M111** spaced not more than ten (10) feet on centers, unless so indicated on plans and/or in Specifications. End, corner,

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angle, pull posts, and gate posts shall be 3.0" O.D., ASTM A53 Table 2, ASTM F1083, and AASHTO M111, unless otherwise indicated on plans and/or in Specifications.

2.04 RAILS

- A. All rails shall be galvanized steel pipe, joined with galvanized steel sleeves and fittings to create a rigid joint, but allowing for expansion and contractions.
- B. Toprails shall be not less than 18 foot long tubular steel, 1-5/8" O.D. (ASTM A53, Table 2, ASTM F1083 and AASHTO M111), unless otherwise indicated on plans. Toprails shall be continuous through line posts and rigidly connected with galvanized malleable or pressed steel fittings at terminal and corner posts.
- C. Where required, intermediate and bottom rails shall be 1-5/8" O.D., (ASTM A53, Table 2, ASTM F1083 and AASHTO M111) unless otherwise indicated on plans, and shall be installed with galvanized malleable iron or pressed steel fittings.

2.05 BRACING

All terminal and corner posts shall be truss braced by means of a 1-5/8" O.D. (ASTM A53, Table 2, ASTM F1083 and AASHTO M111) galvanized steel pipe, securely attached to terminal and first line post with fittings and truss braced from first line post to bottom of terminal post with 3/8" galvanized rod and turnbuckle. Line posts at 500 foot intervals shall be braced in both directions.

2.06 POST TOPS

All post tops shall be heavy malleable iron, hot-dipped galvanized fitted to exclude moisture. Line post tops shall provide for passage of top rail.

2.07 TENSION BARS

Tension bars for attaching fabric to terminal and corner posts shall be 3/16" x 3/4" high carbon steel, hot-dipped galvanized and attached to posts by means of galvanized beveled edge bands.

2.08 FABRIC TIES

Fabric ties shall be No. 9 gauge (U.S. Standard) aluminum wire, and shall be used to attach fabric to top, intermediate, and bottom rails at twenty-four (24) inch centers, maximum, and to line posts at fourteen (14) inch centers, maximum.

2.09 BARBED WIRE

If required by plan, the fabric shall be surmounted with three (3) strands of barbed wire. Each strand shall consist of two No. 12-1/2 (U.S. Standard) wires twisted with four-point barbs with 1" barbs spaced not more than 5 inches apart. Barbed wire shall be hot-dipped galvanized after fabrication. Zinc coated barbed wire shall meet requirements of ASTM A 121, Class 3.

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2.10 BARBED WIRE EXTENSIONS

All posts shall have extensions, the base shall be malleable iron, and the extension pressed steel. Intermediate arms shall have provisions for passing top rails through. Extension arms shall be hot-dipped galvanized after fabrication. The extension arms shall extend either straight up or in or out at an angle of 45 degrees, with the topmost barbed wire one foot (1') above the fabric.

2.11 CONCRETE FOOTINGS

- A. Concrete footings shall be provided for all posts. Post shall be set two (2) inches above bottom of footing, and the top of footing shall be crowned above grade and troweled smooth. Concrete shall have a compressive strength of 3000 psi in twenty-eight (28) days.
- B. Diameter of footing will be three (3) times the diameter of the post, but never less than twelve (12) inches.
- C. Depth of footing will be one-third (1/3) times the fabric height, but never less than twenty-four (24) inches.
- D. The dimensions of the footings shall conform to the above formula unless otherwise indicated on the plans.

2.12 BOTTOM TENSION WIRE

All bottom tension wire shall be No. 7 gauge (U.S. Standard) spring coil or crimped wire, hot-dipped galvanized or aluminum coated. Tension wire shall be stretched taut from terminal post to terminal post and securely fastened to each line post six inches (6") above grade. Attach to fabric with aluminum hog rings every twenty-four (24") inches.

2.13 GATES

- A. Fabricated gate perimeter frames of 2.0" O.D. (**ASTM A53, Table 2, ASTM F1083 and AASHTO M111**) tubular members. Provide additional horizontal and vertical members to ensure proper gate operation and for attachment of fabric, hardware and accessories.
- B. Assemble gate frames by welding of fittings and rivets for rigid connections. Use same fabric as for fence. Install fabric with stretcher bars at vertical edges, and tie wires at top and gate frame at not more than 15": O.C. Attach hardware with rivets or by other means which will provide security against removal or breakage.
- C. Provide diagonal cross-bracing consisting of 3/8" diameter adjustable length truss rods on gates where necessary to provide frame rigidity without sag or twist.
- D. Gate Hardware: Provide the following hardware and accessories for each gate:
 - 1. **Hinges**: Pressed steel or malleable iron to suit gate size, non-lift-off type, offset to permit 180 degrees gate opening. Provide 1 pair of hinges for each leaf.

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2. Latch: Forked type or plunger-bar type to permit operation from either side of gate. Provide padlock eye as integral part of latch.
3. Keeper: Provide keeper for all gates, which automatically engages the gate leaf and holds it in the open position until manually released.
4. Double Gates: Provide gate stops for all double gates, consisting of mushroom type or flush plate with anchors. Set in concrete to engage the center drop rod or plunger bar. Provide locking device and padlock eyes as an integral part of the latch, requiring one padlock for locking both gate leaves.
5. Gates: Install gates plumb, level and secure for full opening without interference. Install ground-set items in concrete for anchorage, as recommended by the fence manufacturer. Adjust hardware for smooth operation and lubricate where necessary.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Prepare the grade and remove surface irregularities, if any, which may cause interference with the installation of the chain link fence.

3.02 INSTALLATION

- A. Chain link fence and gate shall be erected according to the manufacturer's recommendations and standard practices. All heights, opening sizes, and accessories shall be so indicated on plans and/or specified in the Specifications.
- B. All fence fabric shall be stretched tightly to eliminate sag, and all posts shall be set plumb and in a true line and at the proposed finish grade, unless otherwise indicated on the plans and/or in the Specifications.

3.02 CLEAN-UP

All debris resulting from the erection and installation shall be cleaned up, removed, and disposed of by the CONTRACTOR.

END OF SECTION 32-31-13

SECTION 32-80-00 - IRRIGATION

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide all labor, MATERIALS, EQUIPMENT, services and facilities required to perform all WORK in connection with the underground irrigation system, complete, as indicated on the Drawings and specified.
 - 1. WORK noted as "N.I.C." existing," or "by others" is not included in the WORK of this CONTRACT.
- B. Coordination: Coordinate the WORK in this Section with all other underground UTILITIES and with the trades responsible for their installation. Refer to respective Drawings pertaining to the other WORK.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. 329000 Landscaping

1.3 REQUIREMENTS

- A. Reference specifications and standards:
 - 1. ASTM: D 1784 Rigid Poly (Vinyl Chloride) Compounds and Chlorinated Poly (Vinyl Chloride) Compounds.
 - 2. ASTM: D 1785 Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
 - 3. ASTM: F 441 Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40, 80, and 120.
 - 4. ASTM: 2464 Threaded Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80.
 - 5. ASTM: F 437 Threaded Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80.
 - 6. ASTM: D 2466 Socket-Type Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
 - 7. ASTM: F 438 Socket-Type Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 40.
 - 8. ASTM: 2564 Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings.
 - 9. ASTM: F 493 Solvent Cements for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe and Fittings.
- B. Tests and inspections:
 - 1. Hydrostatic tests:

- a. Perform hydrostatic tests in the presence of the Landscape Architect/OWNER'S Representative. Do not backfill over pipe until the installation has been inspected, tested, and approved in writing by the Landscape Architect/OWNER'S Representative.
 - b. Furnish force pump and all other EQUIPMENT required to adequately perform hydrostatic tests.
 - c. All testing shall be approved prior to the installation of remote control valves, quick couplers, or other valve assemblies.
 - d. Maintain 125 psi pressure in the lines for not less than four hours. If leaks develop, remake joints and repeat tests until the entire system is proven watertight.
 - e. Perform all tests prior to backfilling.
- C. Coverage test: When the irrigation system has been completed, perform a coverage test in the presence of the Landscape Architect/OWNER'S Representative to determine if the water coverage for planting, and turf areas is complete and adequate. Furnish all MATERIALS and perform all WORK required to correct any inadequacies of coverage due to deviations from Drawings or where the system has been willfully installed as indicated on the Drawings when it is obviously inadequate or inappropriate without bringing this to the attention of the Landscape Architect/OWNER'S Representative. Perform this test before any ground cover or turf is planted.
- D. Notification of inspections:
1. CONTRACTOR will be responsible for notifying the Landscape Architect/OWNER'S Representative in advance for the following inspections, according to the time indicated:
 - a. Pre-job conference - 7 days.
 - b. Pressure supply line installation and testing - 8 hours.
 - c. System layout - 8 hours.
 - d. Coverage tests - 8 hours.
 - e. Final inspection - 48 hours.
 2. When inspections have been conducted by other than the Landscape Architect/OWNER'S Representative retained by OWNER, show evidence of when and by whom these inspections were made.
 3. During the final inspection, the CONTRACTOR shall be responsible for having a "walkie-talkie" and sufficient personnel to provide instantaneous communication between the inspection area and the controller for the system.

1.4 SUBMITTALS

- A. MATERIALS list: Submit list of all MATERIALS for irrigation system.

1. Furnish the articles, EQUIPMENT, MATERIALS, or processes specified by name on the Drawings and in the Specifications. No substitution will be allowed without prior written approval of the Landscape Architect/OWNER'S Representative.

B. Operating and maintenance data

C. Project record documents:

1. Correct daily to indicate changes from Contract Documents.
 - a. Horizontally at 90 degree angles, dimension the location of the following items from two permanent points of reference, i.e. curb junctions, light standards, building corners, survey hub points, or coordinates, with a tolerance of 12 in. maximum.
 - (1) Irrigation main lines routing.
 - (2) Connection to water supply lines.
 - (3) Irrigation control valves and station numbers.
 - (4) Control timers.
 - (5) Gate valves.
 - (6) Electrical control wire path diagrammatically.
 - b. Record vertical dimensions for mains when site conditions require installation deeper than 24 in.
 - c. As-built field information to be transferred to an electronic Autocad file and turned over to the OWNER upon job completion. (Autocad version 2000 or newer).

D. Checklist:

1. Complete the following checklist at the end of each segment of the PROJECT, using the format shown and on the forms provided:
 - a. Plumbing permits - if none required, so state.
 - b. MATERIAL approvals.
 - c. Pressure line tests - by whom approved and date.
 - d. MATERIALS furnished - recipient and date.
 - e. Manufacturer's warranties, if required - recipient and date.
 - f. Written guarantee - recipient and date.
 - g. Lowering of heads in lawn areas - if not complete, so state and include anticipated completion date.
2. The signed and dated checklist(s) shall be forwarded to the Landscape Architect/OWNER'S Representative before final acceptance of the PROJECT.

1.5 PROJECT CONDITIONS

- A. The OWNER reserves the right to make temporary repairs as necessary to keep the irrigation system EQUIPMENT in operating condition. This in no way alters the requirements of CONTRACT Documents.
- B. Coordinate WORK with that of other trades, all underground improvements, the location and planting of specimen trees and all other planting. Verify location of all planting requiring excavations 24 in. dia. and larger with OWNER prior to installation of main lines.
- C. Provide temporary irrigation at all time to maintain plant MATERIALS.

1.6 WARRANTY

- A. Warrant the entire irrigation and water system to give satisfactory service for a period of one year from the date of acceptance by the OWNER and the Landscape Architect/OWNER'S Representative.
- B. Should any problems develop within the warranty period due to inferior or faulty MATERIALS or workmanship, they shall be corrected at no expense to the OWNER.
- C. Any and all damages resulting from faulty MATERIALS or workmanship shall be repaired by the CONTRACTOR to the satisfaction of the Landscape Architect/OWNER'S Representative and the OWNER, at no additional cost.
- D. Written warranty shall be supplied upon completion of each segment of the PROJECT, showing date of completion and period of warranty.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Plastic pipe and fittings:
 - 1. Pipe: Class 200, PVC plastic, ASTM D 1785, Type I, Grade I for all constantly pressurized mainline.
 - 2. Pipe: Class 160, PVC plastic, ASTM D 1785, Type I, Grade I, for all lateral pipe.
 - a. Where threaded connections are required, use Schedule 80 pipe or thread to socket adapters.
 - b. All pipe shall bear the following markings:

Manufacturer's name, nominal pipe size, schedule or class, pressure rating p.s.i., and the date of extrusion.
 - 3. Fittings: Schedule 40, PVC plastic; socket type, ASTM D 2466, Type I, Grade I.
 - a. Use Schedule 80 threaded fittings where threaded fittings are indicated; Type

I, Grade I, ASTM D 2464, and ASTM F 437 for pressure pipe.

b. All fittings shall bear the manufacturer's name or trademark, MATERIAL designation, size, and applicable I.P.S. schedule.

4. Joints: Socket type, primer and solvent cement; threaded type, Telfon thread compound or tape; in accord with fitting manufacturer's recommendations.

B. Controller: as per plans.

C. Remote control valves: as per plans.

D. Irrigation heads:

1. Rotary irrigation heads: as per plans

2. Pop-up irrigation heads: as per plans.

a. Locate as in areas as shown on Drawings.

b. Install heads in accord with detail on Drawings.

3. Low volume irrigation: type as shown on Drawings.

E. Control wire:

1. Install wiring in the same trench and along the same route as the pressure supply lines wherever possible, and also along the main line whenever possible.

2. When more than one wire is placed in a trench, tape the wiring together at intervals of 12 feet.

3. Make wire splices using Pen-Tite connectors. Make an expansion loop of 12 in. at each wire connection and at each directional turn.

4. Size wire according to manufacturer's recommendations. Common wire to be No. 12 AWG size. Hot wire to be No. 14 AWG size.

5. Use a continuous wire between controller and remote control valves. Do not use wire splices without prior approval. Install each approved splice in a remote control valve box or in a 12 in. round plastic box, marked "electrical wires".

F. Remote control valve boxes:

1. Boxes shall be of the type, size, and MATERIAL noted on the Drawings, as manufactured by Carson, or approved equal.

G. Conduit for control wires: (PVC) Schedule 40, in locations as indicated.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

7/20/16

32-80-00-5
Irrigation

- A. Before WORK is commenced, hold a conference with the OWNER, the General CONTRACTOR, and the Landscape Architect/OWNER'S Representative to discuss general details of the WORK.
- B. Verify dimensions and grades at job site before WORK is commenced.
- C. During the progress of the WORK, a competent superintendent and any assistants necessary shall be on site, all satisfactory to the Landscape Architect/OWNER'S Representative. This superintendent shall not be changed, except with the consent of the Landscape Architect/OWNER'S Representative, unless he proves unsatisfactory and ceases to be employed. The superintendent shall represent the CONTRACTOR in his absence and all directions given to the superintendent shall be as binding as if given to the CONTRACTOR.
- D. Obtain and pay for all plumbing permits and all inspections required by outside authorities.
- E. All WORK indicated or notes on the Drawings shall be provided whether or not specifically mentioned in the Specifications.
- F. If there are ambiguities between the Drawings and Specifications, and specific interpretation or clarification is not issued prior to bidding, the interpretation or clarification will be made only by the Landscape Architect/OWNER'S Representative, and the CONTRACTOR shall comply with the decisions. In the event the installation contradicts the directions given, the installation shall be corrected by the CONTRACTOR at no additional cost to the OWNER.
- G. Layout of irrigation lines shown on Drawings is diagrammatic only. Location of irrigation EQUIPMENT is contingent upon and subject to integration with all other underground UTILITIES. CONTRACTOR shall employ all data contained in the CONTRACT Documents and shall verify this information at the construction site to confirm the manner by which it relates to the installation.
- H. Coordinate the installation of all irrigation MATERIALS, including pipe, with the landscape Drawings to avoid conflict with the trees, shrubs, or other planting. When sub-injected type systems are used, all 15 gallon and larger plant MATERIAL shall be planted before system is installed.
- I. Do not proceed with the installation of the irrigation system when it is apparent that obstructions or grade differences exist or if conflicts in construction details, legend, or specific notes are discovered. All such obstructions, conflicts, or discrepancies shall be brought to the attention of the Landscape Architect/OWNER'S Representative.
- J. Replace, or repair to the satisfaction of the OWNER, all existing paving disturbed during the course of this WORK. New paving shall be the same type, strength, texture, finish, and be equal in every way to the MATERIAL removed.
- K. The OWNER reserves the right to make temporary repairs as necessary to keep EQUIPMENT in operating condition without voiding the CONTRACTOR'S guarantee or relieving the CONTRACTOR of his responsibilities during the guarantee period.

3.2 EXCAVATING AND BACKFILLING

- A. Trenching - general:

1. Dig sides of trenches straight. Provide continuous support for pipe on bottom of trenches. Lay pipe to uniform grade. Trenching excavation shall follow layout indicated on Drawings.
2. Provide minimum cover of 24 in. Where lines occur under paved area, the coverage shall be from bottom of concrete or asphalt paving.
3. Provide minimum cover of 24 in. over all control wire.
4. Unless otherwise noted on Drawings, provide minimum cover of 12 in. over non-pressure lines.
5. Maintain 6 in horizontal minimum clearance between irrigation lines and between all lines of other trades.
 - a. Do not install irrigation lines directly above another line of any kind.
6. Maintain 1 in. vertical minimum between lines which cross at angles of 45 degrees to 90 degrees.
7. Exercise care when excavating, trenching and working near existing UTILITIES.

B. Backfilling:

1. Initial backfill on all lines shall be of a fine granular MATERIAL with not foreign matter larger than 1/2 in.
2. Compact backfill in trenches to dry density equal to the adjacent undisturbed soil, and conform to adjacent grades without dips, sunken areas, humps, or other irregularities.
3. Where feasible, the Landscape Architect/OWNER'S Representative may authorize the sue of flooding in lieu of tamping.
4. Do not, under any circumstances, use truck wheels for compacting soil.
5. Restore grades and repair damages where settling occurs.

C. Routing of piping:

1. Routing of pressure and non-pressure piping lines are indicated diagrammatically on Drawings.
2. Coordinate specimen trees and shrubs with routing of lines.
 - a. Planting locations shall take precedence over irrigation and piping locations.
 - b. Report to OWNER any major deviation from routing indicated.
3. Conform to Drawings layout without offsetting the various assemblies from the pressure supply line.
4. Lay out irrigation heads and make any minor adjustments required due to differences between site and Drawings. Any such deviations in layout shall be within the intent

of the original Drawings, and without additional cost to the OWNER.

5. Lay out all systems using an approved staking method, and maintain the staking of approved layout.

3.3 INSTALLATION

A. Water supply: The pump and well shall be at the approximate locations indicated on the Drawings. Make minor changes caused by actual site conditions without additional cost to the OWNER.

B. Assemblies:

1. Routing or pressure supply lines as indicated on Drawings is diagrammatic only. Install lines and required assemblies in accord with details on Drawings.
2. Do not install multiple assemblies on plastic lines. Provide each assembly with its own outlet. When used, the pressure relief valve shall be the last assembly.
3. Install all assemblies in accord with the respective detail Drawings and Specifications.
4. Brass pipe and fittings, and plastic pipe and threaded fittings shall be assembled using Teflon tape, applied to the male threads only.

C. Plastic pipe:

1. Install plastic pipe in accord with manufacturer's recommendations.
2. Install irrigation head on plastic pipe as indicated on Drawings.
3. Prepare all welded joints with manufacturer's cleaner prior to applying solvent.
 - a. Allow welded joints as least 15 minutes setup/curing time before moving or handling.
 - b. Partially center load pipe in trenches to prevent arching and shifting when water pressure is on.
 - c. Do not permit water in pipe until a period of at least four hours has elapsed for solvent weld setting and curing, unless recommended otherwise by solvent manufacturer.
4. Do backfilling when pipe is cool.
 - a. Pipe can be cooled by operating the system for a short time before backfill, or by backfilling in the early part of the morning before the heat of the day.
5. Curing:
 - a. When the temperature is above 80 degrees F., allow soluble weld joints at least 24 hours curing time before water is introduced under pressure.

6. Flushing the system:

- a. After all irrigation pipe lines and risers are in place and connected, and prior to installation of irrigation heads, open the control valves and flush out the system with a full head of water.
- b. Irrigation heads shall be installed only after flushing of the system has been accomplished to the complete satisfaction of the Landscape Architect/OWNER'S Representative.

7. Installing piping under existing pavement:

- a. Piping under existing pavement may be installed by jacking, boring or hydraulic driving. Hydraulic driving will not be permitted under asphalt paving.
- b. Secure permission from OWNER before cutting or breaking any existing pavement. All repairs and replacements shall be approved by OWNER and shall be accomplished at no additional cost to OWNER.

D. Automatic controller:

1. Install controller in accord with Drawings and manufacturer's instructions.

E. Remote control valves:

1. Install at sufficient depth to provide not more than 6 in., nor less than 4 in. cover from the top of the valve to finish grade.
2. Install valves in a plumb position with 24 in. minimum maintenance clearance from other EQUIPMENT.

F. Wire:

1. Make all underground wire connections to electric remote control valves with Pen-Tite Connectors as manufactured by Rain Bird.
2. Run wire for remote control valves with main line and show on "As-built" PROJECT record Drawings if deviations occur.

G. Gate valves:

1. Install where indicated and with sufficient clearance from other MATERIALS for proper maintenance.
2. Check and tighten valve bonnet packing before backfill.

H. Irrigation heads:

1. Install in a plumb position at intervals not to exceed the maximum spacings indicated.
2. Install heads on temporary risers extending at least 3 in. above grade in lawn or turf areas where grass has not been established.

3. Install heads 1/2 in. above finish grade along curbs, walks, paving, and similar areas. Lower raised irrigation heads within ten days after being notified by OWNER to do so.

3.4 ELECTRICAL

- A. Connect to the 120 volt power source as required. Be responsible for making electrical connections to the automatic controllers, and wire circuits from remote control valves to controllers. As a minimum requirement, install and connect electrical WORK in accord with requirements of applicable codes.

3.5 LOWERING OF HEADS AND FINAL ADJUSTMENTS

- A. Lower all irrigations installed in lawn areas to finish grade within ten days following notification by OWNER.
- B. At time of lowering heads, completely check and adjust the entire system and make any repairs that are necessary to complete the WORK.
- C. When nozzle changes will provide improved coverage, make such changes, or make arrangements with the manufacturer to have adjustments made, as approved by the Landscape Architect/OWNER'S Representative. Make changes prior to planting.
- D. After installation of sub-injected type system, the system shall be thoroughly flushed and then used at full flow capacity to allow area to become totally saturated. After planting, system shall be frequently checked to determine when desired moisture content has been reached by observing the probing soil. Several different settings may be required to establish the proper one. Establish setting as directed by manufacturer's representative and as dictated by site conditions.
- E. Make changes or adjustments in systems without additional cost to the OWNER.
- F. The entire system shall be operating properly before any lawn or ground cover planting operations commence.
- G. The CONTRACTOR shall be responsible one time only, to check-out the correct operation of the systems and adjust or relocate the moisture sensing EQUIPMENT as required for proper operation.
- H. Make such adjustments and repairs as requested or necessary for acceptance, including re-flushing of system.

END OF SECTION 32-80-00

SECTION 32-90-00 - LANDSCAPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS AND REQUIREMENTS

- A. Bidding requirements, general and special conditions, addenda, special requirements, plans, specifications (including Section 32800-Irrigation), notes, details, and CONTRACT agreements, are hereby made part of the general CONTRACT documents.
- B. Permits required by any authority or governing jurisdiction, for any installation or construction WORK described in the CONTRACT documents, shall be obtained by the CONTRACTOR. Any applicable fees or financial requirements are to be paid by the CONTRACTOR for such permits, unless stipulated specifically in writing by the OWNER.
- C. The CONTRACTOR shall comply with all codes, safety requirements, and environmental regulations of federal, state, local and other regulatory agencies that have jurisdiction over the PROJECT, without additional cost to the OWNER. This includes any safety standards of the Occupational Safety and Health Act and amendments. The OWNER and OWNER'S Representative shall be held harmless from any accident, injury or any other incident resulting from compliance or non-compliance with these standards.

1.2 APPLICABLE SPECIFICATIONS AND STANDARDS

- A. Standard specifications of technical or professional societies and federal agencies referred to shall include all amendments as of the date of bid submittal.
 - 1. *Grades and Standards for Nursery Plants*, Florida Department of Agriculture and Consumer Services.
 - 2. *ANSI Standards for Nursery Stock (ANSI Z60.1-1990)*, America National Standard Institute.
 - 3. *Tree, Shrub and Other Woody Plant Maintenance – Standard Practices Pruning (ANSI A300 (Part 1) – 2001 Pruning)*, America National Standard Institute.
 - 4. *Tree, Shrub and Other Woody Plant Maintenance – Standard Practices Fertilization (ANSI A300 (Part 2) – 1998)*, America National Standard Institute.
 - 5. *Best Management Practices, Tree Pruning*, International Society of Arboriculture.
 - 6. *Best Management Practices, Tree and Shrub Fertilization*, International Society of Arboriculture.
 - 7. *Principles and Practice of Planting Trees and Shrubs*, International Society of Arboriculture
 - 8. *Standardized Plant Names*, American Joint Committee on Horticulture Nomenclature, Horace McFarland Company.
 - 9. *American Standard for Nursery Stock*, American Association of Nurserymen, Inc.

1.3 DESCRIPTION OF WORK

- A. The WORK included in this Section include the furnishing of all MATERIALS, EQUIPMENT and labor necessary and incidental to the installation and preparation of planting areas, soil treatment, plants, grassing, protection of existing and proposed plants, hauling and spreading of topsoil, finish grading, removal and / or transplanting of existing plants as indicated, warranty, replacement of plants and / or MATERIALS, and related items as required to complete the WORK as indicated on the plans and fulfilling all warranty provisions, as specified herein.

- B. The WORK shall also include the maintenance of all landscape plants and MATERIALS, planting areas, and sod / seeded areas until the Final Acceptance by the OWNER's Representative. This time period of required maintenance may be extended through the full warranty period, as specified in the CONTRACT agreement, until Final PROJECT Acceptance.
- C. During construction, protect all existing trees, shrubs, and other specified vegetation, site features and improvements, structures, installed elements and UTILITIES specified herein and / or on submitted plans. Removal or destruction of items described above is prohibited unless specifically authorized by the OWNER.
- D. Any WORK taking place along or within an internal private, city, county or state road, median or RIGHT-OF-WAY must comply with appropriate regulatory authority's guidelines for traffic controls for construction and maintenance operations. The CONTRACTOR shall be responsible for filing and obtaining any and all required permits.
- E. All landscape material shall be installed, and at all times maintained, in accordance with FDOT ROADWAY and Traffic Design Standards, Index 546 and FDOT Plans Preparation Manual, Table 2.11.5, as well as all other applicable governing municipality ROADWAY standards and regulations for clear sight.

1.4 QUALITY ASSURANCE

- A. The landscape installation shall be by a single firm specializing in landscape WORK of the type and scale as shown on the plans. The selected firm may not subcontract out more than 50% of the WORK described by the plans and specifications. All subcontractors utilized by the selected firm for WORK on the PROJECT, must be approved by the OWNER, in writing, prior to their involvement on the PROJECT.
- B. The plant list as shown on the plans is for the CONTRACTOR'S information only and no guarantee is expressed or implied that quantities shown therein are correct or that the list is complete. The CONTRACTOR shall verify that all plant material shown on the drawings are included in the CONTRACTOR'S bid.
- C. Substitutions of plant MATERIALS will not be permitted unless authorized in writing by the OWNER's Representative. Proof is to be submitted in writing from 5 different regional sources that a plant specified is not obtainable. Consideration will be given to the nearest available size or similar variety with a corresponding adjustment of the CONTRACT price.
- D. The CONTRACTOR shall review and verify the proposed and existing site elements, including but not limited to, storm drainage, water, sewer, phone, cable and electrical UTILITIES, paving, site grading, buildings, walks, hardscape, and vegetation to preclude any misunderstanding and ensure a trouble free installation.
- E. Stated dimensions shall govern over scaled dimensions on the plans.
- F. The plans shall govern over the specifications. If there is a discrepancy or error in the Plans or Specifications, the CONTRACTOR shall refer the issue to the OWNER's Representative for an interpretation and decision.

1.5 SELECTION AND TAGGING

- A. Plants shall be subject to inspection for conformity to specification requirements and approval by the OWNER's Representative at their place of growth, or upon delivery to the site, as determined by the OWNER's Representative. Such approval shall not preclude the right of inspection and rejection during any phase of the WORK. Rejected plant MATERIALS shall be immediately removed from the PROJECT site and replaced with approved plant MATERIALS within seven (7) days or as approved by the OWNER's Representative.
- B. A written request for the inspection of plant material at their place of growth shall be submitted to the OWNER's Representative at least fifteen (15) calendar days prior to installation. This request shall state the place of growth, species of material, and quantity of plants to be inspected. The OWNER's Representative may refuse inspection at this time if, in his judgment, sufficient quantities of plants are not available for inspection.
- C. The OWNER's Representative may designate a single plant to serve as the minimum representation of an approved plant type (species and size) sample for the total quantity for the PROJECT. Plant samples may be planted in permanent positions on the PROJECT site, but labeled as samples, with the botanical and common name labeled on a waterproof tag.
- D. All plants may be selected and tagged by the OWNER's Representative at their place of growth. For distance material, photographs may be submitted for pre-inspection review and approval by the OWNER's Representative. Pictures shall be clear and contain the full image of the plant material to be reviewed and have a clear indication of size in foot increments for trees and palms and inches for shrubs and groundcovers. The photograph will become the representative sample for that plant type (species and size).
- E. If re-inspection of rejected plant material is required at a site other than the PROJECT site, the CONTRACTOR shall pay the OWNER's Representative's time and expenses incurred during the re-inspection.

1.6 SUBMITTALS

- A. Submit planting schedule showing scheduled dates for each type of planting in each area of site two weeks prior to beginning WORK.
- B. Submit certificates of inspection, as required by governmental authorities, and manufacturers or vendors certified analysis for soil amendments, herbicides, insecticides and fertilizer MATERIALS and any additional data that indicates that the MATERIALS comply with specified requirements.
- C. Prior to installation of the plant material and topsoil, samples of all landscape MATERIALS (topsoil, mulch, fertilizer, etc.) will be required for approval on the site or as otherwise determined by the OWNER's Representative for review and approval. Resubmitted or rejected samples shall be completed within three (3) working days. Approved samples shall be stored on the site and protected until furnishing of MATERIALS is completed. Such approval shall not impair the right of inspection and rejection upon delivery at the site during the progress of the WORK.
- D. The CONTRACTOR shall conduct a minimum of three (3) soil tests at locations as shown on the plans or determined by the OWNER's Representative. The CONTRACTOR shall test each location for soil composition (type, strata, pH, soluble salts, and organic content) and sub-surface

drainage conditions (percolation rate), as a minimum. Soil testing shall be conducted by an approved soil-testing laboratory. The CONTRACTOR shall provide the OWNER's Representative with the results of the soil analyses prior to any installations throughout the PROJECT. If soil conditions are insufficient for proper plant growth, the CONTRACTOR is required to supply recommendations for improving the condition of the soil of each area, to the OWNER's Representative for approval. The CONTRACTOR shall, at the discretion of the OWNER's Representative, proceed with the recommendations for improving the soil conditions.

- E. Provide landscape planting as-built drawings that legibly show actual installation locations of plant material. Identify field changes in dimension and detail and approved changes made by the OWNER's Representative.
- F. Certificates of Plant Inspections shall accompany invoices for each shipment of plants as required by law for transportation. Certificates are to be filed with the OWNER's Representative prior to acceptance of the MATERIALS. Passing inspection by federal or state governments at the place of growth does not preclude rejection of plants at the WORK site.
- G. Upon Final Acceptance of the plant MATERIALS, the CONTRACTOR shall submit two (2) written maintenance instructions recommending procedures for maintenance of plant MATERIALS for a one year cycle.

1.7 DIGGING AND HANDLING OF PLANT MATERIALS

- A. Anti-transpirants, if specified, are to be applied to plants in full leaf immediately before digging. A film shall adequately cover all foliage.
- B. Trees designated as Ball and Burlap (B&B) shall be properly dug with firm natural balls of soil retaining as many fibrous roots as possible in sizes and shapes as specified in the most recent edition of the *American Standard for Nursery Stock*. Balls shall be firmly wrapped with nonsynthetic, rottable burlap and secured with heavy nonsynthetic, rottable twine. Root collar shall be apparent at the surface of the rootball. No trees with loose, broken, or manufactured rootballs will be planted, except with written approval of the OWNER's Representative, prior to planting.
- C. Sabal Palms shall have all frond removed prior to planting, leaving a minimum of twelve (12) inches of new frond growth above the bud. Boots shall be removed from the trunk of sabal palms unless otherwise specified by the OWNER's Representative. Remove only a minimum number of fronds on other palm species to facilitate the handling of the palm material. Do not damage the buds of any palms and take necessary care to protect the bud during digging, handling, transportation and installation.

1.8 TRANSPORTATION AND STORAGE OF PLANT MATERIAL

- A. Fresh dug B&B material is given preference over plant material held in storage. Plant material held in storage will be rejected if excessive growth or dieback has occurred in storage.
- B. Branches shall be tied with rope or twine only, and in such a manner that no damage will occur to the bark or branches.
- C. During transportation of plant material, the CONTRACTOR shall exercise care to prevent injury and drying out of the trees. Should the roots be dried out, large branches broken, rootball damage,

or areas of torn bark, the OWNER's Representative may reject the injured plant material and require replacement of the rejected material at no additional cost to the OWNER.

- D. Plants must be protected at all times from the sun or drying winds. Those that cannot be planted immediately on delivery shall be kept in the shade and kept well watered. Any B&B material shall also be well protected and kept in a moist condition with the rootballs covered with wet peat moss, additional burlap or other acceptable material. Plants shall not remain unplanted any longer than 3 days after delivery. Palms shall be planted within 24 hours of delivery to the PROJECT site. Plants shall not be bound with wire or rope at any time so as to damage the bark or break branches. Plants shall be lifted and handled with suitable support of the soil ball to avoid damaging it.
- E. Plant material that is stored improperly shall receive a special review of acceptance or rejection, established on a case by case basis.
- F. Topsoil shall be kept dry and loose for planting bed mixes.

1.9 MECHANIZED TREE SPADE REQUIREMENTS

- A. Existing trees to be relocated may be moved and planted with an approved mechanical tree spade. The tree spade shall move trees limited to the maximum size allowed for a similar B&B root ball diameter according to the *American Standard for Nursery Stock*, or the manufacturer's maximum size recommendation for the tree spade being used, whichever is smaller. The machine shall be approved by the OWNER's Representative prior to use. Trees shall be planted at the designated locations in the manner shown in the plans and in accordance with applicable sections of the specifications.

1.10 JOB CONDITIONS

- A. Existing Structures / Conditions:
 - 1. The CONTRACTOR shall protect existing pavement, buildings, walks, curbing, walls, hardscape elements, UTILITIES and planting MATERIALS (trees, shrubs, ground covers, etc.) which are not designated for removal on the plans from damage.
 - 2. The CONTRACTOR shall request the proper UTILITY company to stake the exact location of all underground lines including but not limited to electric, gas, cable and/or telephone service prior to layout and excavating of any planting area. The CONTRACTOR shall contact Sunshine State One-Call of Florida, Inc. (SSOCOF) at 1-800-432-4770. Per SSOCOF, the calls shall be made a minimum of two days and a maximum of five days before beginning construction operations. Any conflicts found through this service shall be brought to the immediate attention of the OWNER's Representative for resolution. Not all UTILITIES are members of the Sunshine State One-Call system and direct contact shall be taken as necessary.
 - 3. The CONTRACTOR shall be responsible for the preservation and protection of all site conditions to remain from damage due to this WORK. In the event damage does occur, all damage shall be completely repaired to its original condition. All the costs of such WORK shall be charged to and paid by the CONTRACTOR.
 - 4. The CONTRACTOR shall thoroughly examine the PROJECT site, including sub-surface

soil conditions, existing and proposed elevations and general conditions under which the WORK is to be performed. The CONTRACTOR shall notify in writing of any conflicts or unsatisfactory conditions discovered, prior to beginning WORK. If the CONTRACTOR begins WORK before the unsatisfactory condition have been resolved, this will indicate that the CONTRACTOR has accepted the existing conditions and is responsible to complete the WORK at no additional cost to the OWNER.

5. Should large rocks, debris, buried garbage, building MATERIALS, or other obstructions be encountered that cannot be removed with a trencher or backhoe, the OWNER's Representative shall be notified immediately and the cost for this excavation shall be negotiated, if not previously stipulated in the CONTRACT documents.
6. The CONTRACTOR shall provide barricades for WORK immediately adjacent to existing walks, ROADWAYS, building and adjacent properties to provide protection from damage due to demolition or installation activities, especially by heavy EQUIPMENT. These barricades shall also provide safety for pedestrians and automobiles within the PROJECT area during construction activities.

B. Protection of Existing Plant Materials:

1. The CONTRACTOR shall be responsible for all unauthorized cutting or damage to existing trees not marked for removal on the plans. Such damage may be caused by operation of EQUIPMENT, stockpiling of MATERIALS, careless labor, etc. This shall include compaction by driving or parking inside the drip-line of trees or the spillage of oil, gasoline, or other deleterious MATERIALS within the drip-line of trees.
2. Trees or palms killed or damaged shall be replaced at a cost to the CONTRACTOR of Two Hundred Dollars (\$200.00) per one (1) inch of DBH (diameter at breast height) on an escalating scale that adds an additional twenty percent (20%) per inch for trees and palms over four inches in DBH.
3. The CONTRACTOR shall have a clear understanding and identify each existing tree, shrub and / or palm that is designated to remain or to be removed. The OWNER's Representative shall verify designations prior to commencement of construction. The CONTRACTOR shall be responsible for all brush removal and legal disposal off-site, as indicated on the Plans.
4. The CONTRACTOR shall maintain tree barricades at all times during the construction activities on the PROJECT for all existing trees, palms and other plant material within and adjacent to the limits of construction that are specified to remain. The CONTRACTOR shall refer to the tree protection detail and notes provided within the Landscape Plans.
5. The CONTRACTOR shall provide an International Society of Arboriculture (I.S.A.) Certified Arborist with a minimum of five (5) years experience with similar PROJECTs, to direct appropriate pruning (roots, branches) and/or other treatment necessary to ensure the health, viability and attractiveness of trees and palms to remain. The CONTRACTOR shall be responsible for implementation of the Certified Arborist's instructions.

C. Coordination:

1. The OWNER reserves the right to CONTRACT for and perform other or additional construction on or adjacent to the WORK covered by these specifications.
2. The CONTRACTOR shall conduct the WORK so as not to interfere with or hinder the progress of construction activities performed by other CONTRACTORS. CONTRACTORS working on the same PROJECT shall cooperate with each other and as directed by the OWNER.
3. The CONTRACTOR shall arrange the WORK, place and dispose of the MATERIALS being used as not to interfere with the operations of the other CONTRACTORS within or near the limits of the PROJECT. The CONTRACTOR shall join this WORK with that of the others in an acceptable manner and shall perform it in proper sequence to that of the others.
4. The CONTRACTOR shall prepare a construction schedule upon the award of the CONTRACT and forward to the OWNER's Representative for approval. The schedule shall take into consideration and coordinate with the WORK to be performed by other CONTRACTORS involved with the overall PROJECT.
5. The CONTRACTOR shall be responsible for all cost associated with completion of WORK in the specified time as stated in the approved PROJECT schedule, including any unforeseen overtime hours or holiday cost.

D. Inspection of Work:

1. Uncover specified WORK when directed by the OWNER's Representative without compensation. Should the material, workmanship, or method of installation not meet the standards specified herein, the CONTRACTOR shall replace the WORK at his own expense.
2. Rejected WORK shall be removed and corrected within seventy-two (72) hours upon notification of rejection by the OWNER's Representative.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Plant Materials:

1. Plants shall be true to species, variety and size as specified on the plans and nursery grown in accordance with good horticultural practices under climatic conditions similar to those in the locality of the PROJECT.
2. Plant species nomenclature and identification shall be as designated by *Hortus Third*, Bailey and Bailey, or *Standardized Plant Names*, American Joint Committee on Horticulture Nomenclature.
3. All plant material shall comply with all required inspections, grading standards and plant regulations, as set forth by the Florida Department of Agriculture and Consumer Services Division of Plant Industry, *Grades and Standards for Nursery Plants*, latest edition. All plant material shall also conform to ANSI Standards for Nursery Stock (ANSI Z60.1-

1990).

Plant MATERIALS not specifically covered in "Florida's Grade and Standards for Nursery Plants" shall conform to a minimum grade of Florida No. 1 as to: health and vitality, condition of foliage, root system, freedom from pests or mechanical damage; heavily branched and densely foliated according to the accepted normal shape; freedom from low and/or "V" shaped crotches.

4. The minimum grade for all plant material shall be Florida No. 1 or better.
5. All container grown MATERIALS shall be healthy, vigorous, well-rooted plants and established in the container so that the root mass will retain its shape and hold together when removed from the container. The plant material shall not be loose in the container and have been grown in the container for a minimum of four (4) months. The plants shall have tops, which are of good quality and are in a healthy growing condition. Container material shall not be root bound in the container and will not be accepted. Plants shall not be handled by stems or foliage.
6. Unless specifically noted, all plant material shall be of specified quality, symmetrical, fully developed in form. The plant material shall be sound, healthy, vigorous, well-branched and densely foliated when in leaf, free of disease and insects, eggs, or larvae; and shall have healthy, well-developed root systems. They shall be free from physical damage or other conditions that would prevent vigorous growth.
7. Trees with multiple leaders, unless specified, will be rejected. Trees with a damaged or crooked leader, bark abrasions, sunscald, disfiguring knots, insect damage, or cuts of limbs over $\frac{3}{4}$ inch in diameter that are not completely closed will be rejected.
8. Palms shall have straight trunks (within 3 degrees of vertical) unless other wise stated on the plans. Palms shall be free from burn marks and / or other damage to the trunk.
9. Any plant material showing signs of shock will be reviewed by the OWNER's Representative on a case by case basis for acceptance or rejection.
10. Plants shall conform to the measurements specified, except that plants larger than those specified may be used if approved by the OWNER's Representative. Use of larger plants shall not increase the CONTRACT price. If larger plants are approved, the root ball shall be increased in proportion to the size of the plant. The approved larger plants shall not be cut back to the size specified.
11. Nurseryman's Responsibility for Correct Grade of Plants: In the event that it becomes apparent that any nursery supplying plants for this WORK has knowingly and consistently represented the grade of plants as being higher than the actual grade as determined under the provisions, all plants delivered from such source shall be removed from the job at the CONTRACTOR'S expense, and no further plants will be acceptable from such nursery until written evidence is submitted and conformed that all material for delivery has been inspected and approved by inspectors of the State Plant Board as being of the grade as represented.
12. Plant Measurements:

a. Trees and Palms:

Overall heights for trees shall be measured from the ground to the average height of canopy. Spread shall be measured to the end of branching equally across the crown that is symmetrical above the main trunk. Single trunk trees shall be free of low crotches below seven (7) feet in height and cross-branching that could be points of weak limb structure or disease infestation.

Tree caliper (trunk diameter) is measured 6 inches from the ground on trees up to and including 4 inches in caliper, and 12 inches above the ground for larger trees, per Florida Grades and Standards for Nursery Plants.

Tree DBH (diameter at breast height) is measured at 4 ½ feet above grade / top of root ball.

Clear trunk (C.T.) height for palms shall be measured from the soil line to a point in the canopy where the trunk caliper begins to taper abruptly, per Florida Grades and Standards for Nursery Plants.

b. Shrubs:

Overall heights for shrubs shall be measured from the ground to the average point where mature plant growth stops. Spread shall be measured to the end of branching equally across the shrub mass.

13. Balled and burlapped (B&B) plants (field grown trees and palms) shall be dug with firm, natural balls of soil of sufficient size to encompass the fibrous and feeding roots of the plants. No plants moved with a ball shall be planted if the ball is cracked or broken. B&B root balls shall exhibit small white fibrous roots coming through the burlap. Field grown trees and palms shall be nursery grown material.

Root pruning and hardening off of plant material shall be done a minimum of six (6) weeks or for a period as determined by the OWNER's Representative, prior to planting at the PROJECT. The supplier of the tree material shall supply certification of the date of root pruning and harvest date of the tree material, prior to the installation of the trees at the PROJECT site.

Protect roots or balls of plants at all times from sun and drying winds, excess water and freezing, as necessary until planting.

B. Prepared Planting soil:

1. Prepared planting soil shall be fertile, friable natural topsoil of loamy character, without admixture of subsoil material, obtained from a well-drained arable site, reasonably free from clay, lumps, coarse sands, stones, plants, roots, sticks and other foreign MATERIALS. The acidity range shall be between pH 5.5 and 6.5. Prepared planting soil mixture shall consist of three (3) parts native topsoil meeting the above requirements and one (1) part peat. The peat shall be brown to black in color, sterile, weed and seed free, granulated raw peat, containing not more than 9% mineral content on a dry basis.

C. Water:

1. Planting shall be coordinated with the underground automatic irrigation system(s) installation. The irrigation system is to supply 100 percent coverage of water to all required landscape plant material and turf at time of landscape installation.
2. The CONTRACTOR shall supply supplemental water; over the amount of water supplied by the irrigation system, for establishment to all newly installed trees and palms for ninety (90) days, commencing immediately after installation. Supplemental water can be supplied by water truck or direct water source on site (hose bib, reclaimed water, pump/well source), and shall be applied in such a manner to avoid disturbance to mulch and soil, and to avoid damage to plant MATERIALS.

It is the CONTRACTOR'S responsibility to adjust watering amounts and frequency to ensure proper establishment of all plant material.

3. All water necessary for planting and maintenance shall be of satisfactory quality to sustain adequate growth of plants and shall not contain harmful natural or manmade chemicals, acids, alkalis, salts or other elements detrimental to plants.
4. During the landscape installation, the CONTRACTOR is responsible to water-in plants at no cost to the OWNER and continue watering until Final Acceptance.
5. The CONTRACTOR shall be responsible for the watering schedule, and shall determine the amount, frequency per week and number of weeks required for plant establishment.
6. Watering shall be accomplished in a workmanlike manner in accordance with the best-recognized watering practice of the trade.
7. The plant material shall be watered to contain sufficient moisture for size and type of plant. The moistened condition shall extend to at least the full depth of the rooting zone.

D. Fertilizer:

1. Fertilizer shall be complete, uniform in composition, dry and free flowing. Fertilizer shall be delivered to the site in the original unopened containers, each bearing the manufacturer's statement of analysis. Store in a manner to prevent wetting and deterioration.

E. Mulch:

1. 100% organic shredded Melaleuca, Pine bark or Eucalyptus mulch (or type approved by the OWNER) shall be utilized and installed to a wetted depth of three (3) inches. Mulch shall be free of extraneous sticks and other tree residue.

F. Herbicide:

1. A pre-emergent herbicide (Rout, Ronstar or approved equal) shall be applied to all planting areas as specified in Section 3.
2. All planting and lawn areas shall be free of nut grass, torpedo grass, and other noxious

weeds. "Round-Up" or approved equal shall be applied to all planting areas as specified in Section 3.

G. Sod

1. Sod shall be as specified on the plans, in areas designated on the plans, and for disturbed areas within the construction limits, grass sod type shall be well matted with grass roots. The sod shall be taken up in rectangles, preferably 12" x 24", shall be a minimum of 2" in thickness, and shall be live, fresh, and uninjured at the time of planting. Sod shall be a minimum of 95% free from all noxious weeds, other grasses, and extraneous MATERIALS. The sod shall have a soil mat of sufficient thickness adhering to the roots to withstand all necessary handling.
2. The sod shall be planted as soon as possible after being dug, and kept moist and shaded until it is planted. Dumping from vehicles will not be permitted and damaged sod will be rejected. Replanting shall be performed within 24 hours after time of harvesting or sod shall be stacked in an approved manner and properly moistened until planted. Sod which has been cut for more than 72 hours shall not be used unless specifically authorized by the OWNER's Representative, after inspection of the sod.

PART 3 - EXECUTION

3.1 INSPECTION

A. UTILITIES (Overhead and Underground)

1. The WORK area may have existing UTILITIES, such as, but not limited to, irrigation, phone, cable, electrical, water, sanitary sewer, and storm sewer. The locations of some of these existing UTILITIES may have been indicated on the Plans. However, no guarantee is implied that the Plans are accurate or complete in reference to existing UTILITY information. It shall be the responsibility of the CONTRACTOR to verify the location of all such UTILITIES, structures, etc., by hand excavation or other appropriate measures before performing any WORK that could result in damage or injury to persons, UTILITIES, structures or property. The CONTRACTOR shall make a thorough search of the site for UTILITIES, structures, etc., before WORK is commenced in any particular location.
2. The CONTRACTOR shall take immediate steps to repair, replace, or restore all services to any UTILITIES or other facilities which are disrupted due the CONTRACTOR'S operations. The CONTRACTOR shall also engage any additional outside repairs on a continuous basis until services are restored. CONTRACTOR shall provide and operate any supplemental temporary services to maintain uninterrupted use of the facilities. All responsibility for damage due to negligence on the part of the CONTRACTOR shall be borne by the CONTRACTOR and the CONTRACTOR shall also be fully responsible for any and all claims resulting from the damage.
3. Should UTILITIES, structures, etc., be encountered which interfere with the WORK, the OWNER's Representative shall be consulted immediately for a decision to be made on the relocation of the WORK so the conflict can be resolved, if the obstruction cannot be relocated.

4. The CONTRACTOR shall not purposefully disrupt or disconnect any type of UTILITY without first obtaining the written permission of the OWNER's Representative and UTILITY OWNER/company. Requests for disconnection must be in writing and received by the OWNER's Representative and applicable UTILITY OWNER/company at least 72 hours prior to the time of the requested interruption.

3.2 EXCAVATION / PREPARATION OF PLANTING AREAS

- A. The CONTRACTOR shall notify the OWNER's Representative, in writing, of soil conditions that the CONTRACTOR considers detrimental to the growth of plant material. These conditions are to be described, as well as suggestions for correcting them. Proper soil percolation must be assured at a minimum rate of ½" percolation per hour to a depth of a typical tree planting pit.
- B. Planting areas are to be finished graded to conform to grades on engineering drawings or as noted on the landscape drawings, after full settlement and installation has occurred. The CONTRACTOR shall correct or repair the grades as necessary to conform to the finished grades specified. All planting areas shall be free from concrete debris, lumps, depressions, rocks, sticks or other debris and shall be raked and graded smooth to conform to the finish grades after the installation of landscape MATERIALS. The planting areas shall provide positive surface drainage without puddling of water. This requirement is applicable to sodded areas also. Sodded areas shall present a smooth and finished appearance, meeting finished grades as specified after installation.

3.3 DIGGING, DELIVERY, STORAGE, AND HANDLING

- A. Protection of Palms:

Only a minimum of fronds shall be removed from the crown of Washington palm trees to facilitate moving and handling. Washington palm heads shall be tied with a burlap strip per the following procedure: Prune the outer ring of fronds. Tie the remaining fronds with biodegradable twine. Tied fronds and bud tip shall not be clipped. Twine shall be left in place until a time as determined by the OWNER's Representative, not to exceed date of Final Inspection. Sabal palms shall be "cigar cut", per industry standards, prior to installation at the PROJECT site.

- B. Take all precautions customary in good trade practice in preparing plants for moving. workmanship that fails to meet the highest standards will be rejected. Dig, pack, transport, and handle plants with care to ensure protection against injury. Inspection certificates required by law shall accompany each shipment invoice or order. Upon arrival, the certificate shall be filed with the OWNER. Protect all plants from drying out. If plants cannot be planted immediately upon delivery, properly protect them with soil, wet peat moss, or in a manner acceptable to the OWNER's Representative. Water heeled-in plantings daily. No plant shall be bound with rope or wire in a manner that could damage or break the branches.
- C. Plant material that is stored improperly shall receive a special review of acceptance/rejection, established on a case by case basis.
- D. Cover plants transported on open vehicles with a protective covering to prevent windburn and other wind damage.

3.4 PLANTING PROCEDURES

- A. All MATERIALS and EQUIPMENT shall be installed in a neat and workmanlike manner. The OWNER's Representative reserves the right to direct the removal and replacement of any items, which, in his opinion, do not present an orderly and workmanlike appearance. Plant locations may also be adjusted by the OWNER's Representative due to unforeseen on-site conditions.
- B. Work Notification:
1. Notify OWNER's Representative at least seven (7) working days prior to installation of plant material. All plant samples to be reviewed for approval prior to notification.
- C. Cleaning-up Prior to Commencing Work:
1. Clean-up WORK and planting areas of rubbish or objectionable matter. Mortar, concrete and toxic material shall be removed from the surface of all plant beds. These MATERIALS shall not be mixed with the soil. Should the CONTRACTOR find conditions beneath the soil, which will in any way adversely affect the plant growth, he shall immediately call it to the attention of the OWNER's Representative. Failure to do so before planting shall make the corrective measures the responsibility of the CONTRACTOR.
- D. Obstructions Below Ground:
1. If underground construction, UTILITIES or obstructions are encountered during the excavation of planting areas or pits, alternative locations for the plant material shall be selected by the OWNER's Representative. Such changes in location shall be made by the CONTRACTOR without additional compensation.
- E. Plant Material Layout:
1. Stake tree or plant locations depicted on the Plans prior to digging pits, making all necessary adjustments. Large planting areas shall be scaled from the plans and plants spaced according to specified spacing on the plant list. All proposed planting areas must be approved for planting by the OWNER's Representative prior to placement of prepared planting soil backfill mix. Planting areas shall be free of extraneous MATERIALS and capable of percolation prior to backfill.
 2. All required trees and palms shall be placed a minimum of four (4) feet from impervious surfaces; shrubs shall be placed a minimum of 18 inches as measured from the edge of the plant.
 3. All shrub beds shall be considered as a single mulched area. There shall be no sod incorporated within such planted areas. All shrub and groundcovers shall be mulched curb-to-curb or edge of planting bed, unless otherwise indicated. Top of mulch shall be level with the top of curb or surrounding grade.
- F. Excavation for Planting:
1. Sides of pits and trenches shall be vertical. When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, and/or obstructions, the

OWNER's Representative shall be notified before planting. Sites with poor drainage may require the use of sloped sides, for pits or trenches.

2. In planting areas where soils have been compacted to a density, which is detrimental to plant growth, loosen soils to allow root penetration beyond the planting pit.
3. Fill excavations for trees and shrubs with water and allow to percolate out just prior to planting. Percolation rate should be a minimum of ½" per hour. If soil does not properly percolate, notify the OWNER's Representative immediately for resolution.
4. Width of planting pit shall be 3 times the diameter of the rootball in highly compacted or poorly draining soils, with the sides of the pit sloped.

G. Fertilizer:

1. Trees and Shrubs: Fertilizer shall be Osmocote Time Released Fertilizer and composed of a fertilizer ratio of 3:1:1 or 3:1:2, (nitrogen: phosphorus: potassium) and contain all primary and secondary trace elements, or approved equal.
2. Sodding: Fertilizer shall be composed of sixteen percent (16%) nitrate nitrogen, four percent (4%) phosphorus, eight percent (8%) potassium and contain all primary and secondary trace elements for sodded areas, or approved equal.
3. Palms: Fertilizer shall be composed of twelve percent (12%) nitrogen, four percent (4%) phosphorus, twelve percent (12%) potassium and contain all primary and secondary trace elements for Florida palm trees.
4. Fertilizer shall be applied at the rates recommended by the manufacture and soil testing laboratory. Fertilizer shall be applied as a top dressing only and shall not be mixed in with the backfill material at time of installation. The CONTRACTOR shall apply fertilizers at the time of installation. Fertilizer shall be applied per ANSI 300, Part 2 – 1998 and Best Management Practices, Tree and Shrub Fertilization, ISA.

H. Material Placement:

1. Trees, shrubs and ground cover shall be set straight and at such a level, that after settlement, the plant ball will stand flush, to 1" - ½" above grade. Each plant shall be set in the center of the planting pit (see planting details). Planting goal shall be thoroughly "watered-in" to remove all air pockets around the root ball. Do not rely on the irrigation system to achieve this task. All burlap, rope wires, etc. shall be loosened from the top and sides of the ball, but no burlap shall be pulled from underneath. No more than two (2) inches of soil shall remain over the first major root closest to the soil surface. Remove non-biodegradable nursery wrappings and unwrap burlap from the top 1/3 of the rootball.
2. Plant MATERIALS such as trees, shrubs and groundcovers shall be planted prior to the planting of the grassed / sodded areas. The grassed / sodded areas shall be protected during and repaired if damaged during the planting installation activities.
3. All new furnished trees and palms shall be set plumb at the time they are installed to within a tolerance of three (3) degrees from vertical. Trees and palms found not to be vertically aligned will not be accepted.

4. All plant material shall be installed and maintained at all times in a manner whereby traffic control signs and devices will not be screened to motorist or pedestrians.

I. Water Basin:

1. A basin shall be built around all plants or trees that stand-alone and are not located in larger mulched beds. A water-holding soil-dam shall be built on the outside edge of the planting pit to form a basin of sufficient volume to hold water, as per the Planting Details.

J. Pruning:

1. Each tree shall be pruned to preserve the natural character of the plant as shown on the Plans. All softwood (sucker growth) and all broken or badly damaged branches shall be removed with a clean cut. Pruning procedures shall conform to ANSI A300 Part 1 – 2001 and Pruning and Best Management Practices, Tree Pruning, by the International Society of Arboriculture. All pruning shall be previously approved by the OWNER's Representative.

K. Tree and Palm Staking and Guying:

1. Procedure shall be in accordance with sound nursery practices and by the approval of the OWNER's Representative to ensure stability and maintain plants in an upright position. Refer to planting details on the plans for specific procedure for each tree/palm requirement.

L. Mulching:

1. Within one week after the planting, mulch material, as specified, shall be uniformly applied to a minimum wetted thickness of three (3) inches or as indicated on the Plans, over the entire area of the backfilled hole or bed. The mulch shall be maintained continuously in place until the time of final inspection.
2. All trees not within planting beds shall be mulched within a three (3) foot diameter of the tree.
3. Do not place mulch immediately against trunks of trees and palms.

3.5 HERBICIDE WEED CONTROL

- A. A pre-emergent herbicide (Rout, Ronstar or approved equal) shall be applied to all planting areas at rates according to label directions and the following methods.
- B. All planting and lawn areas shall be free of nut grass, torpedo grass, and other noxious weeds. "Round-Up" or approved equal shall be applied to all planting areas as needed and determined on-site by the OWNER's Representative and the CONTRACTOR for weed control.
 1. Seasonal planting beds and turf areas will not only be excluded, but specifically protected from accidental broadcast of material to those areas. Shrub and ground cover beds using containerized plant MATERIALS will be treated.

2. Planting will be properly installed, soil tamped and final watering complete for 24 hours before application. Treated areas shall be inspected by OWNER's Representative prior to mulch application. Mulch will be applied after the pre-emergent weed killer is broadcast.
3. The CONTRACTOR shall prevent the herbicide material from lodging on the shrub foliage or the leaf axil and the CONTRACTOR shall the plant material free from herbicides during application.
4. Turf areas near beds which receive pre-emergence herbicide must be protected from accidental spillage or drift. If herbicide damage becomes evident within the first growing season, the CONTRACTOR will replace damaged sod and topsoil to a depth of four (4) inches.

3.6 SODDING

- A. Soft spots and inequalities in grade shall be corrected before starting sod WORK.
- B. Soil shall be watered before planting.
- C. Tamp or roll all newly installed sod. Sod shall be thoroughly watered in.
- D. The setting of the pieces shall be staggered so as to avoid a continuous seam. The offsets of individual strips shall not exceed 6". In order to prevent erosion caused by vertical edges at the outer limits, the outer pieces of sod shall be tamped so as to produce a feathered edge effect. On steep slopes, the CONTRACTOR shall, if so directed, prevent the sod from sliding by means of wooden pegs driven through the sod blocks into firm earth, at directed intervals. Sod shall be placed in rows perpendicular to the slope.
- E. The Bahia sod shall be kept in a moist condition to the full depth of the rooting zone for at least two (2) weeks after placement. It is the responsibility of the CONTRACTOR to apply water as necessary until the sod roots begin to grow. The St. Augustine or other sod species shall be irrigated by an automatic, underground irrigation system providing 100% coverage with sufficient water for long term healthy condition.

3.8 PROJECT APPEARANCE

- A. The PROJECT site shall be kept in a relative neat and clean appearance throughout the course of the landscape installation. Perform cleaning during installation of the WORK and upon completion of the WORK. Remove from the site all excess MATERIALS, soil, debris, and EQUIPMENT. Repair damage resulting from planting and other landscape installation operations.

3.9 PROJECT WARRANTY

- A. New Plant Material:
 1. Provide one (1) year warranty covering the life and satisfactory condition of all planted MATERIALS. All sod shall be warranted for 90 days after Final Acceptance. The one (1) year warranty does not begin until the entire landscape installation has been accepted by the OWNER's Representative at the time of Final Acceptance for Landscape WORK.

After the one (1) year warranty period, the OWNER's Representative shall conduct the PROJECT's Final Inspection.

2. All plant material and turf not found in a healthy growing condition, questionable survivability or dead at the end or at any time during the warranty period shall be removed from the site and replaced within ten (10) calendar days after written notice.

B. Replacement Materials and Methods:

1. All plant material replacements shall be of the same kind and size as specified in the Plant List. They shall be furnished, planted, mulched and watered-in as specified at no additional cost to the OWNER. These replacement MATERIALS shall be bound to the same warranty conditions as the original MATERIALS.

C. Exceptions to Warranty:

1. Damage to plant material from obvious vandalism, theft, OWNER's neglect, or acts of providence (i.e., prolonged flooding, gale force winds, etc.), or incidents beyond the CONTRACTOR'S control will not be covered under this warranty.

3.10 FINAL INSPECTION AND ACCEPTANCE OF WORK

- A. The CONTRACTOR shall notify the OWNER's Representative in writing, a minimum of ten (10) days in advance, when all WORK is substantially complete to schedule a substantial completion. Based on this inspection, the OWNER's Representative will develop a punch list of items to be addressed by the CONTRACTOR. Upon completion of Punch List items, the CONTRACTOR shall coordinate with the OWNER's Representative to schedule a Final Acceptance Inspection. At the time of Final Acceptance, the warranty period shall begin.
- B. Upon Final Acceptance of the plant material, the CONTRACTOR shall submit two (2) written maintenance instructions recommending procedures for the maintenance of plant MATERIALS and sod, for a one year period.

END OF SECTION 32-90-00

PASCO COUNTY FIRE & RESCUE STATION NO. 12

SECTION 33-11-00 - WATER DISTRIBUTION

1.01 GENERAL

- A. The CONTRACTOR shall furnish all MATERIAL, labor, and EQUIPMENT to construct a complete system for conveying water under pressure, including all piping, fittings, adapters, taps, services, valves, thrust blocking, hydrants, meter boxes, and such other appurtenances as shown on the drawings or called for in these specifications.
- B. Where MATERIALS and/or EQUIPMENT are specified by brand name or manufacturer, the intent is to establish a minimum level of performance, a standard of quality, or to identify a preferred system based on previous experience. The CONTRACTOR may choose an alternate for substitution provided that the alternate is submitted in writing to the ENGINEER for approval prior to purchase, installation, or use. The CONTRACTOR shall assume full responsibility for replacement of any alternate EQUIPMENT or MATERIALS installed which are not specified, approved, or shown on the drawing.
- C. All codes, specifications, standards, etc., referenced herein shall be of the issue in effect on the date of Invitation to Bid.
- D. All pipe and fittings shall be clearly marked with the name of manufacturer, batch number and strength designation as applicable.
- E. All construction MATERIAL and EQUIPMENT shall be in accordance with **Pasco County "Standard for Design and Construction of Water, Wastewater and Reclaimed Water Facilities"**. In the event of conflict between these specifications and **Pasco County's standards, Pasco County standards** shall govern.

1.02 PIPE & FITTINGS

- A. PVC – 2 INCHES AND LARGER
 - 1. PVC pipe and fittings 3 inch diameter and smaller called for on the drawings, the pipe shall be **Type I Rigid Polyvinyl Chloride 1120 Schedule 40, ASTM D-1785**, 20 feet laying length NSF approved.
 - 2. PVC pipe and fittings 4 inch through 12 inch called for on the drawings, the pipe shall be blue in color, **Type I Rigid Polyvinyl Chloride 1120 DR 18 AWWA C 900 (Class 150), ASTM 1784** (cast iron pipe equivalent OD), 20 feet laying lengths, NSF approved.
 - 3. PVC pipe and fittings 14 inch through 24 inch called for on the drawings, the pipe shall be blue in color, **Type I Rigid Polyvinyl Chloride 1120 DR 25 AWWA C 905 (Class 165), ASTM 1784** (cast iron pipe equivalent OD), 20 feet laying lengths, NSF approved.
 - 4. PVC bells shall be integrally extruded with the pipe barrel in the manufacturing process and comply with **ASTM D 2672**.
 - 5. PVC joints shall be push-on and may be bell and spigot type or coupling (double bell) type, both with elastomeric ring gaskets conforming with **ASTM F477** and **ASTM D 3139** for

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push-on joint. Assembly of the joints during installation shall be in strict conformance with ASTM D 2774 and the manufacturer's instructions and recommendations, with particular care given to comply with the depth of insertion.

6. PVC fittings shall be Type 1 Grade 1 polyvinyl chloride, pressure rated to equal or exceed pipe pressure rating, with integrally extruded bells and elastomeric ring gaskets equal to and compatible with the pipe.
7. Unless otherwise specified, fittings for use with AWWA C-900 pipe shall be ductile iron as specified in Paragraph 1.02.C.3 below.

B. HIGH DENSITY POLYETHYLENE (HDPE)

1. Where called for on the drawings, high density poly-ethylene (HDPE) pipe shall conform with AWWA C901/C906 and ASTM D2239 / D2737 - DR 11, 200 P.S.I Min. and shall be NSF approved for potable water service and shall be legibly marked with a blue stripe to identify the pipe as a water main.
2. Pipe joints or fittings shall be installed using butt fusion techniques per the manufacturer's recommendations and complying with ASTM D326/F2620 unless otherwise noted in the plans and/or approved by the ENGINEER.
3. When joining PVC or ductile iron pipe to HDPE pipe, a ductile iron restrained coupling per ASTM A536 shall be used complying with ANSI/AWWA C111/A21.11 and otherwise matching the companion pipe in all respects to joints, pressure ratings, and coatings.
4. No threaded or solvent welded/glued HDPE joints are permitted.

C. DUCTILE IRON

1. Ductile iron pipe shall conform with ANSI/AWWA C150/A21.50 and ANSI/AWWA C 151/A21.51 for Class 50 pipe, with minimum 1 mil. exterior bituminous coating, cement lined conforming with ANSI/AWWA C104/A21.4, 18 foot laying length.
2. DI joints shall be push-on type rubber gasketed in accordance with ANSI A21.11/AWWA C 111 unless otherwise called for on the drawings.
 - (a) Where mechanical joint pipe is shown on the drawings, the joints shall comply with ANSI A21.11/AWWA C 111.
 - (b) Where flanged joints are shown on the drawing, flanges shall be ductile iron integrally cast with pipe or threaded, complying with ANSI A 21.15/AWWA C 115, with bolt holes and circles complying with Class 125 ANSI B 16.1.
3. DI pipe fittings shall be ductile iron complying, with ANSI/AWWA C 110/A21.10 Class 350 and otherwise matching the companion pipe in all respects to joints, pressure ratings, and coatings. Short-body patterns shall normally be installed. Long-body fittings shall be used where the drawing specifically calls for long-body fittings or at the option of the CONTRACTOR when the laying length is not controlled by short-body patterns.

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D. RESTRAINED JOINTS

1. Where required on drawings, restrained mechanical joints shall be coupled with retaining type ring glands as manufactured by may be of the types fabricated by the various manufacturers, upon approval Ebba Iron MegaLug, or approved equal.
2. Restrained "push-on" joint pipe shall be as designed and manufactured by American Ductile iron Pipe Company "T.R. Flex" or approved equivalent

E. TIE RODS

Steel for tie rods and tie bolts shall conform to the requirements of **ASTM Designation A 242**, and rods shall be 304 stainless steel. Tie rods and tie bolts shall be Super Star Tierod and Tiebolt as manufactured by Star National Products.

1.03 VALVES AND VALVE BOXES

- A. Gate valves 2" and larger shall be bronze mounted resilient wedge (R/W), iron body, non-rising stem, with mechanical joints unless otherwise noted on drawings. Valves shall conform to **AWWA Standard C-509**. Manufacturer to furnish glands, gaskets, bolts and nuts to match companion piping. Each valve shall be equipped with a standard two (2) inch square operating nut. Valve closure shall be clockwise.
- B. Butterfly valves shall be tight closing, rubber seats recess mounted in stainless steel retainer, cast iron body, 18-8 Type 304 stainless steel solid shaft, permanently lubricated bearings, corrosion resisting disc, sealed and grease packed operator with standard two (2) inch nut, clockwise closure, Valves shall conform with **AWWA C 504, Class 125-16, Class B**, for buried service. Joints shall conform with companion pipe.
- C. Check valves shall be iron body, bronze mounted, full opening, swing weighted outside lever type with stainless steel hinge pins and O-ring packed gland, bronze faced clapper, and bronze bushings with joints compatible to companion piping. Units shall be rated for 150 psi minimum working pressure and permit full flow equal to that of the connecting pipe.
- D. A valve box shall be slip type ductile iron, installed for each underground valve. The valve box shall be minimum 5" interior diameter, with open base, adjustable barrel and extension as required in the field, and furnished with drop cover marked with the letter "WATER". A 2'x2'x6" thick concrete pad, with a #4 rebar around the perimeter, shall be poured around each valve box at grade level or as directed by the ENGINEER.
- E. Fire Hydrants shall be cast iron body, fully bronze mounted, dry barrel, with grease or oil reservoir for shaft lubrication, O-ring seal type, with a minimum 5 1/4 inch full valve opening, two 2 1/2 inch hose nozzles and one 4 1/2 inch pumper nozzle National Standard threads, with chained covers. Hydrants shall conform to **AWWA Standard C-502**, traffic model. The operating nut shall be National Standard pentagon, clockwise closure. The hydrant shall be shop primed with one zinc coat followed by two coats of approved paint and color. The hydrant shall have six (6) inch mechanical joint shoe for ductile iron companion piping. See drawing standards for installation. Tie rods shall be solid, continuous steel, min. 20,000 psi tensile strength, threaded each end.
- F. Tapping Sleeves/Saddles

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1. Tapping sleeves and crosses shall be fabricated steel, sized and gasketed to match existing water main pipe size and type, 200 psi working pressure, and with **Class 150 ANSI B 16.1** outlet flange **AWWA C207**, drilling recessed for tapping valve. Sleeve shall be completely epoxy coated **AWWA C213-79** and shall utilize **AISI Type 304** stainless steel bolts.
 2. Tapping saddles shall be ductile iron or epoxy coated steel with stainless steel hardware. The sealing gasket shall be "O" ring type. Tie straps and bolts shall be a corrosion resistant alloy steel.
- G. Tapping valves shall conform to the specification herein for gate valve for the applicable service conditions. Additionally, units shall be comparative with the connecting sleeve or saddle and specifically designed for wet tapping installation.
- H. Services shall be provided as shown on the drawings and detailed in the standards.
1. Service saddles for pipe six inches and greater shall be cast iron body with stainless or electro-galvanized steel double straps or bronze body with bronze double straps, with FIPT, and neoprene gasket. Saddles for pipe four inches and less shall be brass full circle type.
 2. Corporation stops and curb stops shall be brass, equipped with connections compatible with the connecting service pipe type; must have pack joint type connections for polyethylene tubing with locking collars and stainless steel inserts.
 3. Meter boxes shall be high density polyethylene plastic body with cast iron reader lid imprinted with "Water Meter", equal to those manufactured by Ametek, Standard 12" size.
- I. Air/Vacuum Release Valves
1. Air/vacuum release valves shall be installed as indicated on the Drawings. Valves shall be cast iron body, suitable for domestic water service, rated for a minimum 150 psi working pressure, equipped with a vacuum ball to prevent air return and shall be as manufactured by APCO, Val-Matic, Crispin, or equivalent with NPT threads. Valve shall have a minimum inlet size of one inch.

1.04 INSTALLATION

- A. The CONTRACTOR shall be responsible for delivery scheduling, handling, and storage of all MATERIALS used in construction, following manufacturer's recommendations and good practice.
- B. Unless otherwise noted on the drawings or specified herein:
1. PVC pipe and fittings shall be installed in accordance with **ASTMD 2774** and manufacturer's recommendations. The embedment of pipe shall conform with Class C as detailed in **ASCE Manual No. 37**. In the event unstable soils are encountered at pipe elevation, the trench bottom shall be stabilized with pea rock, drainfield limerock or similar MATERIAL as approved by the ENGINEER.

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2. DI pipe and fittings shall be installed in accordance with AWWA C600 for Type II trench conditions and in further conformance with manufacturer's recommendations. In the event unstable soils are encountered at pipe elevation, Type 4 trench conditions shall prevail.
 3. All pipe to be installed with minimum of 36 inches of cover unless otherwise indicated on drawings.
 4. Trench width at pipe elevation shall be not less than pipe diameter plus 8 inches nor more than pipe diameter plus 14 inches.
 5. Trench depths shall not exceed requirements for the pipe elevation except where unstable soil conditions are encountered, in which case the trench bottom is to be over excavated and backfilled in accordance with **Part 1.04B(1) within this Section.**
- C. In the event of a conflict between the installation standards and the manufacturers recommendations, the ENGINEER'S interpretation and instructions shall prevail.
- D. No more than 200 linear feet of trench shall be open in advance of the completed pipe laying operation without prior approval of the ENGINEER. Pipe trenches across roadways and driveways shall be backfilled as soon as pipe is installed. Where, in the opinion of the ENGINEER, adequate detour facilities, are not available, no trench shall be left open across a traveled roadway for a period in excess of thirty (30) minutes, or as directed by the governing authority. No trench shall be left open across any driveway for more than twenty-four hours. Under all conditions, the backfilling operations shall closely follow pipe installation such that the amount of open trench at the close of each working day shall be kept to a minimum. Any open trench shall be properly barricaded and signed.
- E. The CONTRACTOR shall use every precaution during construction to protect the pipe against the entry of dirt, wood, small animals and any other foreign MATERIAL that would hinder the operation of the pipeline using water-tight plugs or other approved means. Where the ground water elevation is above the bottom of the trench, the CONTRACTOR shall provide suitable dewatering EQUIPMENT. All piping shall be placed in a dry trench.
- F. Valve boxes shall be set on brick or block foundations around the valve such that the valve box does not press down upon the valve or adjacent pipe when subjected to any vertical load. The top of valve box and concrete pad shall be set to match surrounding finished grades, unless otherwise directed by the ENGINEER.
- G. Connections to other pipes, structures, or system elements shall be coordinated with the OWNER of that pipe, structure, or system element, including permits or written permission, advance notification of the connection, and scheduling of inspection by the OWNER or his authorized representative.
1. Tapping saddles or sleeves shall be pressure tested after installation and before tapping of the existing water main.
- H. Service lines shall be installed as shown on the standards. All piping, fittings and valves shall be laid on undisturbed soil or, in the event of unstable soils, on a stabilized base as directed by the ENGINEER. Service lines and appurtenances shall be installed at maximum depth from the main to the meter box. Installation of lines across roadway or proposed roadways shall require a Sch. 40-2 inch PVC or Sch. 26 - 3 inch PVC solvent weld joint pipe as a sleeve.

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Water service lines shall be staked to ensure that the curb stop valve(s) is a minimum of 2 feet from property line. Water services not installed within a meter box shall be temporarily attached to a 2" x 4" P.T. with top 6" painted blue. Services shall also be identified by marking edge of pavement with a 3" x 6" blue paint patch.

- I. Backfill MATERIAL shall be free of roots, rubble, rocks greater than 3 inches, vegetation or similar MATERIAL deleterious to the backfill compaction.
 1. Following pipe installation, selected backfill shall be placed and handtamped each side of the pipe up to the pipe radius point.
 2. Additional backfill shall be placed up to 18 inches above top of pipe and mechanically tamped and compacted.
 3. Balance of backfill shall be placed, compacted, and the area graded, dressed, and grassed where noted on the drawings.
 4. All WORK under pavement shall be conducted in conformance with the appropriate agency requirements.
 5. Where installation is within Department of Transportation right-of-way, backfilling and compaction shall comply with **F.D.O.T. standards** and permit.
- J. Where installation requires removal of pavement, curb and gutter, driveways, sidewalk, or similar conflicting structures, those structures shall be removed along neat lines of sufficient width to allow proper installation, and replaced "in kind". Prior to replacement, the compacted subgrade and base shall be inspected and approved. Density and compaction tests may be required by the authority having jurisdiction over the structure or right-of-way. Pavement shall be re-placed as shown on the standards and in accordance with the "**Florida Department of Transportation Standard Specifications for Road and Bridge Construction**".
- K. Blow-off and bacterial sampling assemblies shall be installed as shown on the drawings and the standards.
- L. Deadened lines shall be valved and one length of pipe installed beyond the valve. A plug, tapped blowoff, and thrust block shall be installed at the end of the pipe. Following testing, sterilization, and acceptance of the system, the blowoff shall be removed and plugged as shown on drawings.
- M. Fire hydrants shall be installed as located on the drawings and illustrated on the standards. Placement relative to structures, easements, and rights-of-way shall be determined by the ENGINEER in the field, unless otherwise described on the standards. Hydrants shall be set plumb, with pumper nozzle perpendicular to street centerline, and with bury line at finished grade. A gate valve and box shall be installed on the hydrant leg. Rods or thrust blocks shall be installed as shown on the standards.
- N. Where the crossing of state roads or railways by boring and jacking of pipe and/or encasement is indicated on the drawings, such construction shall be done in strict compliance with the requirements of the **Florida Department of Transportation or the Railway**. Before such construction is started, at least two (2) days notice shall be given the local Maintenance engineer of the Department

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of Transportation or rail-way. The pipe or encasement shall be installed true to line and grade and in accordance with the standards. Where voids are encountered or created by the installation, such voids shall be completely filled with a concrete grout, satisfactory to the Maintenance engineer of the **Florida Department of Transportation or Railway**, within six (6) hours after discovery or creation of the void unless otherwise directed by the Maintenance Engineer. Each end of the casing shall be sealed.

- O. Metalized warning tapes shall be provided for all water mains. Such tape shall be Blue Terra, Type D, 2 inch wide, imprinted with the words "Caution: Water Lines Below", or equal. The tape shall be placed 12 inches below final grade, unless otherwise specified. Additionally, PVC pipe buried underground shall be wrapped with copper tape.

1.05 PAVEMENT REPLACEMENT

- A. **General Requirements:** The requirements, conditions and statements enumerated below are relevant to all permanent type pavement replacements unless otherwise shown on the Drawings.
 - 1. References to section numbers and article numbers of the State Department of Transportation used herein are as used in the **"Florida State Department of Transportation Standard Specifications for Road and Bridge Construction"**.
 - 2. The restoration of all surfaces as described herein shall be completed as soon as is reasonable and practical. In no case shall the surface go unfinished for more than sixty (60) days after backfilling unless otherwise directed by the ENGINEER.
 - 3. All existing pavement cut or damaged by construction under this CONTRACT shall be replaced.
 - 4. All pavement outside of the trench area damaged by the CONTRACTOR shall be properly restored at the CONTRACTOR'S expense.
- B. **Responsibility for Replaced Pavement:** The CONTRACTOR shall be fully responsible for the restoration of all areas within the public right-of-way which were disturbed by his operations, to the satisfaction of the OWNER for a period of one (1) year from the date of substantial completion. In the event of settlement of paved areas more than 1/4" below the undisturbed adjacent permanent pavement, the CONTRACTOR shall make the necessary repairs to restore the pavement level within ten (10) calendar days after notification by the OWNER that a defect exists. The cost of such repairs shall be borne by the CONTRACTOR.
 - 1. The pavement replacement shall be in accordance with the details shown on the Drawings and described herein.
 - 2. The edges of the existing pavement shall be trimmed with a concrete saw or other approved method to provide a clean edge around the repair.
- C. **Temporary Patch Pavement:** Where construction occurs on streets or roads that must be opened to traffic promptly, a temporary patch pavement shall be installed. The pavement shall be limerock with a compacted thickness of not less than six (6) inches conforming to limerock base paragraph of this section of these Specifications.

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The finished surface shall conform with the adjacent pavement surface, and shall be maintained in good condition until the permanent type pavement is placed, which shall be not less than thirty (30) days after placing temporary paving.

- D. Shell, Marl, Clay, Shellrock or Similarly Surfaced Roads, Streets & Driveways: Where such roads, streets or driveways are crossed or traversed by pipeline trenches, they shall be restored in all respects to the condition existing prior to excavation WORK. The CONTRACTOR may reclaim the existing MATERIAL, if care is used in so doing, by stockpiling or other acceptable means, but shall make up any deficiency of MATERIAL lost by wastage or otherwise with similar new MATERIAL; or he may, at his option, furnish all new MATERIAL. No separate payment will be made for the removal and replacement of such surfacing. The CONTRACTOR is expected to visit the site of the WORK and determine for himself the conditions and extent of such semi-surfaced areas, and include in an appropriate bid item the cost of replacing and processing this surfacing to its original condition.

1.06 TESTING

- A. A leakage and pressure test shall be conducted in the presence of the ENGINEER and OWNER'S representative. The CONTRACTOR will provide a suitable pressure gauge and measuring device for the test. The gauge shall provide for dampening in order to minimize instantaneous fluctuations. The ENGINEER or OWNER shall have the option to provide the gauge for the test and the CONTRACTOR shall provide the labor to connect and disconnect the gauge provided. The CONTRACTOR shall also provide all other necessary apparatus, including a pump, piping connections and fittings, and the necessary labor to conduct the test. The test shall be conducted at a pressure of not less than 150 PSI, and shall be in accordance with **Section 13 of AWWA C600**.
1. If no detectable drop in pressure is observed within two (2) hours lapsed time, then the test shall be terminated and the line accepted.
 2. If a detectable drop in pressure is observed in the two (2) hour lapsed time period, the leakage shall be calculated. If leakage is less than the allowable, the test shall be terminated and line accepted.
 3. If leakage is greater than the allowable for testing, the test shall be terminated and line repaired and re-tested.
- B. The following formula shall be used for allowable leakage:

$$L = \frac{SD(P)^{1/2}}{133,200}$$

L = Allowable leakage in gallons per hour
D = Pipe diameter, inches
P = Test pressure (150 PSI minimum)
S = Length of pipe, in feet

- C. Following the leakage test, each section of completed pipeline shall be flushed as thoroughly as possible. The following minimum flows shall be used:

<u>Pipe Size</u>	<u>Gallons Per Minute</u>
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2 Inch	25
4 Inch	100
6 Inch	220
8 Inch	390
10 Inch	610
12 Inch	880

- D. Water for testing and flushing will be made available, by the UTILITY having jurisdiction, based on a prevailing fee schedule and the new system capacity times three. If the testing and flushing results in discharges to the wastewater treatment system, additional fees will be charged. All requests for water shall be directed to, and coordinated with, the respective UTILITY.

1.07 DISINFECTION

The CONTRACTOR shall sterilize all distribution and service lines in accordance with AWWA C651. Chlorinated water shall be fed into the system so as to result in a chlorine residual at all points in the system as follows:

- Tablet Method: The Tablet Method gives an average chlorine dose of approximately 25 mg/L.
- Continuous-Feed Method: The Continuous-Feed Method gives a 24-hour chlorine residual of not less than 10 mg/L.
- Slug Method: The Slug Method gives a 3-hour exposure of not less than 5 mg/L free chlorine.

Valves and hydrants shall be manipulated for disinfection of all working parts. Two consecutive day's water samples for bacteriological examination shall be taken at connection point to an existing system and at the end point of the proposed extension; any water line branching off the main extension; and a minimum of 1200 feet on straight run of pipe; and submitted to the nearest Department of Health bacteriological laboratory. Disinfection shall not be considered satisfactory until laboratory reports indicate that the water in the system is suitable for drinking. Copies of bacteriological main clearance shall be taken and submitted to the ENGINEER of Record within 30 days of the submittal of Certification of Construction completion to applicable permitting agencies.

1.08 RESTORATION

Where pavement, trees, shrubbery, fences or other property and surface structures not designated as pay items, have been damaged, removed or disturbed by the CONTRACTOR, whether deliberately or through failure to carry out the requirements of the CONTRACT Documents, State Laws, municipal ordinances or the specific direction of the ENGINEER, or through failure to employ usual and reasonable safeguards, such property and surface structures shall be replaced or repaired at the expense of the CONTRACTOR to a condition equal to that before WORK began.

1.09 CLEAN-UP

The CONTRACTOR shall maintain the site of the WORK in a neat and workmanlike condition. The CONTRACTOR shall remove all excess MATERIALS, excess excavated MATERIALS and all debris resulting from his operations and upon completion, leave the site of the WORK in essentially the same condition as he found it. Any and all settlement shall be corrected and surface drainage restored. Grassed areas disturbed by construction, or areas designated on the drawings for new grass, shall be sodded, seeded or sprigged and mulched as specified.

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1.10. RECORD DRAWINGS

- A. The CONTRACTOR shall, before approval of Final Payment by the ENGINEER, provide the ENGINEER with a set of construction drawings noting all changes to vertical and horizontal alignment made during construction. The CONTRACTOR shall write "Record Drawings" on the cover sheet, sign, and date it.

END OF SECTION 33-11-00

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SECTION 33-31-00 - GRAVITY SEWER COLLECTION

1.01 GENERAL

- A. The CONTRACTOR shall furnish all MATERIAL, labor, and EQUIPMENT to construct a complete system for collecting and conveying sewage by gravity, including all piping, fittings, services, adapters, manholes, castings.
- B. Where MATERIALS and/or EQUIPMENT are specified by brand name or manufacturer, the intent is to establish a minimum level of performance, a standard of quality, or to identify a preferred system based on previous experience. The CONTRACTOR may choose an alternate for substitution provided that the alternate is submitted in writing to the ENGINEER for approval prior to purchase, installation, or use. The CONTRACTOR shall assume full responsibility for replacement of any alternate EQUIPMENT or MATERIALS installed which are not specified, approved, or shown on the drawing.
- C. All codes, specifications, standards, etc. referenced herein shall be of the issue in effect on the date of Invitation to Bid.
- D. All pipe and fittings shall be clearly marked with the name of manufacturer, batch number and strength designation as applicable.
- E. All construction MATERIAL and EQUIPMENT shall be in accordance with **Pasco County "Standard for Design and Construction of Water, Wastewater and Reclaimed Water Facilities"**. In the event of conflict between these specifications and **Pasco County's standards, Pasco County standards** shall govern.

1.02 PIPE

- A. All PVC gravity sewer mains and service laterals shall conform to **ASTM-D-3034, SDR35**; for depths of 0-12 feet, **SDR26** for depths of 12-18 feet and ductile iron for depths below 18 feet with PVC slip joint fittings in accordance with **A.S.T.M. Specifications Section D2321** and shall be solid green pipe with white letters, pipes installed at depths of less than 4' shall be **AWWA C-900 (Class 100) , DR-25 PVC, or C-905 (Class 165), PVC DR-25.**
- B. Where ductile iron is called for on the drawings, pipe shall conform with **ANSI/AWWA C150/A21.50** and **ANSI/AWW C151/A21.51** for **Class 50** Pipe, with minimum one mil exterior bituminous coating and shall be cement mortar lined, standard thickness, in accordance with **ANSI/AWWA C104/A21.4.**
 - 1. DI joints shall be push on type with gaskets conforming with **AWWA C111/ANSI A21.11.**

1.03 MANHOLES

- A. Manholes shall be cylindrical, precast, reinforced concrete sections conforming with **ASTM C-478** and manufactured for minimum 4,000 psi strength concrete using Type II portland cement, with 4 foot interior diameters unless otherwise noted on the drawings. The bottom section shall be precast monolithically with wall. Flexible sleeves similar and equal to KOR-N-SEAL shall be pre-cast to meet pipe alignment and grade. Joints shall be tongue and groove, incorporating the use of asphalt

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mastic or soft plastic rope. The top section shall be eccentric cone. The interior surface shall receive two coats of coal tar epoxy, or approved equal, to a minimum thickness or not less than 12 mils, covering all surface areas completely. Steps are not required.

- B. Manhole frames and covers shall be of quality cast iron, clear of cracks, holes or other defects, and machined for uniform seating, equal to type shown on standards.
- C. Inverts shall be formed, shaped, and constructed to affect smooth flow of sewage through the manhole. Where the flow direction is straight, the CONTRACTOR is encouraged to use one half round pipe pieces fabricated by cutting a piece of SDR 35 pipe along the centerline and cementing in place. For all other flow conditions, the invert shall be formed in place with 3,000 psi concrete consisting of one part Type M Portland Cement, one part hydrated lime, and six parts sand. Channels and benches shall conform to the details shown on Standard sheet(s) in the Drawings. Changes in flow direction shall be made in a smooth curve of as large a radius as the manhole size will permit.
 - 1. Drop manholes as shown on the Standard sheet shall be constructed wherever the drop exceeds 24 inches.
 - 2. All manholes shall be installed on a stabilized base.

1.04 INSTALLATION

- A. The CONTRACTOR shall inspect the pipeline right-of-way and arrange for resolution of all above or below ground conflicts. Clearing and grubbing shall be limited to the assigned rights-of-way or as directed by the ENGINEER. All trees, treetops, stumps, underbrush and similar MATERIAL removed from the right-of-way shall be disposed of in compliance with all applicable regulations or laws. Conflicts such as cultivated vegetation, fences, mailboxes, and similar structures shall be temporarily removed and preserved for replacement after construction is completed. Existing UTILITIES and other above ground or underground obstructions are shown on the drawings to the extent of available information. The accuracy of location and depth is not guaranteed. The CONTRACTOR shall endeavor to protect all obstructions from damage, and in the event of damage, shall make repairs to restore them to the original condition, at CONTRACTOR'S expense.
- B. The CONTRACTOR shall be responsible for delivery scheduling, handling, and storage of all MATERIALS used in construction, following manufacturer's recommendations and good practice.
- C. Trench excavation shall not exceed grade of the pipe and Class C bedding requirements except in unstable soil conditions. Where unstable soil conditions are encountered, the ENGINEER shall be promptly notified, and such soils removed to the depth where suitable soil conditions exist. Crushed stone shall be used to bring the trench grade back to the required elevation for the full trench width, and mechanically compacted. Crushed stone shall be Miami or Ocala limerock, 3/4 inch and smaller, or approved local rock or gravel.
 - 1. Sides of the trench shall be as vertical as possible, consistent with safety requirements. Trench widths at the top of the pipe shall not exceed 8 inches each side of pipe barrel.
 - 2. All piping and appurtenances shall be installed in a dry ditch unless otherwise directed by the ENGINEER. The CONTRACTOR shall provide such EQUIPMENT, techniques, and labor to remove water from the trench.

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3. Wherever the presence of incipient slides or water bearing soils are encountered, the trench walls shall be restrained with adequate sheeting and shoring. Whenever wood sheeting or other timbers are driven to depths at or below pipe elevation, the sheeting and timbers shall be left in place up to 4 feet above pipe elevation.
 4. Where rock excavation is required and authorized, the rock shall be removed to a minimum of 4 inches below pipe grade and select soils or limestone shall be placed and compacted for bedding.
 5. Trench bottoms shall be accurately graded to provide uniform bearing of the pipe barrel on undisturbed soil or prepared bedding, except for bells, where undercutting of grade is required. The trench bottom shall be rounded so that the bottom quadrant of the pipe barrel rest firmly in the pipe bed.
 6. Excavated MATERIAL suitable for backfill shall be safely deposited along and adjacent to the ditch. Undesirable MATERIAL and excess soil shall be moved from the site and disposed of in an approved manner.
- D. Pipe laying shall proceed upgrade with bells facing upgrade, each bell being laid true to line and grade, and backfill placed and compacted around pipe barrel to secure the bell from displacement during subsequent jointing.
1. Pipe bells and spigots shall be cleaned and lubricated in accordance with manufacturer's recommendation, and jointed to the required depth of insertion. Only lubricants furnished or recommended by the pipe manufacturer shall be permitted.
 2. Pipe handling, jointing, and installation shall conform strictly with the manufacturer's recommendations. In the event of any conflicts between the manufacturer's recommendations and these specifications, the ENGINEER'S interpretation and instructions shall prevail.
 3. No more than 200 linear feet of trench shall be open in advance of the completed pipe laying operation without prior approval of the ENGINEER. Pipe trenches across roadways and driveways shall be backfilled as soon as practical after pipe is installed. Where, in the opinion of the ENGINEER, adequate detour facilities are not available, no trench shall be left open across a traveled roadway for a period in excess of thirty (30) minutes, or as directed by the governing authority. No trench shall be left open across any driveway for more than twenty four hours. Under all conditions, the backfilling operations shall closely follow pipe installation such that the amount of open trench at the close of each working day shall be kept to a minimum. Any open trench shall be properly barricaded and signed.
 4. The CONTRACTOR shall use every precaution during construction to protect the pipe against the entry of dirt, wood, small animals and any other foreign MATERIAL that would hinder the operation of the pipeline, using water tight plugs or other approved means. Where the ground water elevation is above the bottom of the trench, the CONTRACTOR shall provide suitable dewatering EQUIPMENT. All piping shall be placed in a dry trench.
 5. Metalized warning tapes shall be provided for all non-metallic gravity sewer pipe. Such tape shall be Terra, Type D, 2 inch wide, imprinted with the words "Caution: Sewer Lines Below", or equal. The tape shall be placed 12 inches below final grade unless otherwise specified.

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6. Where installation requires removal of pavement, curb and gutter, driveways, sidewalk, or similar conflicting structures, those structures shall be removed along neat lines of sufficient width to allow proper installation, and replaced "in kind". Prior to replacement, the compacted subgrade and base shall be inspected and approved. Density and compaction tests may be required by the authority having jurisdiction over the structure or right-of-way. Pavement shall be replaced as shown on the standards and in accordance with the **"Florida Department of Transportation Standard Specification for Road and Bridge Construction"**.
 7. Where construction is required within state rights-of-way, all WORK shall be in strict conformance with all requirements of **Florida Department of Transportation**. All necessary barricades, detours, lights and other protective measures shall be provided for the protection of both pedestrian and vehicular traffic. Final cleanup along the right-of-way and inspection of repaired sections of the pavement shall be subject to the approval of the District Engineer of the **Florida Department of Transportation**. The Engineer will handle all arrangements with the Department of Transportation, the County, and other political subdivision in connection with processing of permits necessary for the WORK. Equal conditions shall apply for construction within the authority of other local government jurisdictions.
 8. Where pipelines cross under the roadbed of a railroad, the CONTRACTOR shall make the pipe installation in full compliance with the requirements of the railway company for such pipe crossings through the roadbed and under the tracks. The installation shall be made to the full satisfaction and approval of the railway company. The CONTRACTOR shall furnish a letter or other written evidence from the railway company that these requirements have been complied with.
 9. Any required encasement or pier supports shall be constructed in accordance with details shown within the construction drawings.
 10. Pipe connections to existing manholes shall be made so that finished WORK will conform as nearly as possible to the essential requirements for new manhole construction.
 11. The CONTRACTOR shall install wye or tee-wye fittings with lateral pipe in the size(s) and locations designated on the drawings. The wyes and piping shall be laid on undisturbed soil or stabilized subgrade, and with a minimum slope of one percent.
- E. Manhole excavation and other appurtenances shall be limited to the minimum area necessary for safety and installation. Over depth excavation shall be prohibited unless authorized by the ENGINEER or required for base stabilization.
- F. Backfilling shall be by hand from trench bottom to one-half pipe depth and hand tamped. Additional backfill shall be placed up to two feet above pipe and mechanically tamped. Backfill MATERIAL shall be deposited in the trench for the full width, equally each side of pipe centerline.
1. **Over Pipe:** In areas where there are no paved or hard surfaced roads, and where settlement is unimportant, the CONTRACTOR may backfill the trench from an elevation two (2) feet above the pipe to the top of the trench with the excavated MATERIAL neatly rounded over the trench area at a sufficient height to allow for settlement to grade after consolidation,

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except that where crossings are necessary, the height of the backfill shall be limited to three (3) inches above the ground surface. The CONTRACTOR shall maintain the backfill, for the life of the CONTRACT, so that it does not settle more than one (1) inch below the ground surface.

2. Under Pavement: Where the excavation is made under future paved areas, or through permanent pavements, curbs, driveways or sidewalks, or where such structures are undercut by the excavation, the entire backfill to the subgrade of the pavement or structures shall be made with predominantly sandy MATERIAL free from rock, stones or vegetable matter, except that rocks passing a 3-1/2 inch ring will be permitted in the backfill between the elevation two (2) feet above the top of the pipe, and one (1) foot below bottom of the pavement. The entire backfill MATERIAL shall be compacted to a density of not less than 100% of the maximum density, as determined by ASSHTO T-99. Compaction shall be done by means of rapid striking mechanical tampers. Compaction by flooding or puddling will be permitted only by written authorization of the ENGINEER.
3. Roads, walks and driveways consisting of broken stone, gravel, marl, shell, shellrock or a conglomerate of such MATERIALS are not considered as being permanent pavement.
4. Backfill around manholes or other appurtenances, shall be selected, placed, and compacted as described for pipe.
5. Well point holes shall be filled with concrete grout.

1.05 PAVEMENT REPLACEMENT

- A. General Requirements: The requirements, conditions and statements enumerated below are relevant to all permanent type pavement replacements unless otherwise shown on the Drawings.
 1. References to section numbers and article numbers of the State Department of Transportation used herein are as used in the **"Florida State Department of Transportation Standard Specifications for Road and Bridge Construction"**.
 2. The restoration of all surfaces as described herein shall be completed as soon as is reasonable and practical. In no case shall the surface go unfinished for more than sixty (60) days after backfilling unless otherwise directed by the ENGINEER.
 3. All existing pavement cut or damaged by construction under this CONTRACT shall be replaced.
 4. All pavement outside of the trench area damaged by the CONTRACTOR shall be properly restored at the CONTRACTOR'S expense.
- B. Responsibility for Replaced Pavement: The CONTRACTOR shall be fully responsible for the restoration of all areas within the public right-of-way which were disturbed by his operations, to the satisfaction of the OWNER for a period of one (1) year from the date of substantial completion. In the event of settlement of paved areas more than 1/4" below the undisturbed adjacent permanent pavement, the CONTRACTOR shall make the necessary repairs to restore the pavement level within ten (10) calendar days after notification by the OWNER that a defect exists. The cost of such repairs shall be borne by the CONTRACTOR.

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1. The pavement replacement shall be in accordance with the details shown on the Drawings and described herein.
 2. The edges of the existing pavement shall be trimmed with a concrete saw or other approved method to provide a clean edge around the repair.
- C. **Temporary Patch Pavement:** Where construction occurs on streets or roads that must be opened to traffic promptly, a temporary patch pavement shall be installed. The pavement shall be limerock with a compacted thickness of not less than six (6) inches conforming to limerock base paragraph of this section of these Specifications.
- The finished surface shall conform with the adjacent pavement surface, and shall be maintained in good condition until the permanent type pavement is placed, which shall be not less than thirty (30) days after placing temporary paving.
- D. **Shell, Marl, Clay, Shellrock or Similarly Surfaced Roads, Streets & Driveways:** Where such roads, streets or driveways are crossed or traversed by pipeline trenches, they shall be restored in all respects to the condition existing prior to excavation WORK. The CONTRACTOR may reclaim the existing MATERIAL, if care is used in so doing, by stockpiling or other acceptable means, but shall make up any deficiency of MATERIAL lost by wastage or otherwise with similar new MATERIAL; or he may, at his option, furnish all new MATERIAL. No separate payment will be made for the removal and replacement of such surfacing. The CONTRACTOR is expected to visit the site of the WORK and determine for himself the conditions and extent of such semi-surfaced areas, and include in an appropriate bid item the cost of replacing and processing this surfacing to its original condition.

1.06 TESTING

- A. **Visual:** Sewer mains will be inspected by the ENGINEER to determine whether any displacement of the pipe has occurred after the trench has been backfilled and tamped as specified. The inspection will be made by flashing a light between the manholes, or if the manholes have not as yet been constructed, between the locations of the manholes, by means of a flashlight or other light source. When complete, manholes shall be visually inspected for compliance with these specifications and drawings.
- B. Leakage testing shall be performed by air pressure. Air pressure testing, based on **ASTM F-1417**, shall be performed by plugging each end of a sewer line segment, air is slowly introduced into the section, until the air pressure is raised to approximately 4.0 psi. After the pressure of 4.0 psig is obtained, regulate the air supply so that the pressure is maintained between 3.5 to 4.0 psig for at least 2 min depending on air/ground temperature conditions. The air temperature should stabilize in equilibrium with the temperature of the pipe walls. The pressures will normally drop slightly until equilibrium is obtained; however, a minimum of 3.5 psig is required. Once the section of pipe is stabilized, disconnect the air supply and decrease the pressure to 3.5 psi before starting the test. Determine the time required for the pressure to drop from 3.5 psi to 2.5 psi, and compare this interval to the required time to decide if the rate of air loss is within the allowable. Minimum holding times required by pipe diameter are shown in Table 1 and Table 2.
- C. All leakage tests shall be made by the CONTRACTOR in the presence of the ENGINEER. All costs of the above tests, including cost of water, shall be borne by the CONTRACTOR, and shall be

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included in CONTRACT prices for the sewer pipe. A written report will be made on all tests and submitted to the ENGINEER.

- D. All observed deficiencies from visual inspections or line segments failing the tests shall be repaired to the satisfaction of the ENGINEER and testing rescheduled. Successful passage of testing shall be a prerequisite to payment for the constructed WORK.
- E. Sewer line segments and appurtenances which will be located under paved areas shall be inspected and tested prior to pavement construction.

1.07 RESTORATION

Where pavement, trees, shrubbery, fences or other property and surface structures not designated as pay items, have been damaged, removed or disturbed by the CONTRACTOR, whether deliberately or through failure to carry out the requirements of the CONTRACT Documents, State Laws, municipal ordinances or the specific direction of the ENGINEER, or through failure to employ usual and reasonable safeguards, such property and surface structures shall be replaced or repaired at the expense of the CONTRACTOR to a condition equal to that before WORK began.

1.08 CLEAN-UP

The CONTRACTOR shall maintain the site of the WORK in a neat and workmanlike condition. The CONTRACTOR shall remove all excess MATERIALS, excess excavated MATERIALS and all debris resulting from his operations and upon completion, leave the site of the WORK in essentially the same condition as he found it. Any and all settlement shall be corrected and surface drainage restored. Grassed areas disturbed by construction, or areas designated on the drawings for new grass, shall be sodded, seeded or sprigged and mulched as specified.

1.09 RECORD DRAWINGS

- A. The CONTRACTOR shall, before approval of Final Payment by the ENGINEER, provide the ENGINEER with a set of construction drawings noting all changes to vertical and horizontal alignment made during construction. The CONTRACTOR shall write "Record Drawings" on the cover sheet, sign, and date it.

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AIR TEST TABLE

Based on Equations from ASTM F-1417

SPECIFICATION TIME (min:sec) REQUIRED FOR PRESSURE DROP
FROM 3-1/2 TO 2-1/2 PSIG WHEN TESTING ONE PIPE DIAMETER ONLY

TABLE 1 Minimum Specified Time Required for a 1.0 psig Pressure Drop for Size and Length of Pipe Indicated for Q = 0.0015

NOTE 1—See Practice UNI-B-6-90.

NOTE 2—Consult with pipe and appurtenance manufacturer for maximum test pressure for pipe size greater than 30 in. in diameter.

Pipe Diameter, in.	Minimum Time, min:s	Length for Minimum Time, ft	Time for Longer Length, s	Specification Time for Length (L) Shown, min:s								
				100 ft	150 ft	200 ft	250 ft	300 ft	350 ft	400 ft	450 ft	
4	3:46	597	0.380 L	3:46	3:46	3:46	3:46	3:46	3:46	3:46	3:46	3:46
6	5:40	398	0.854 L	5:40	5:40	5:40	5:40	5:40	5:40	5:40	5:42	6:24
8	7:34	298	1.520 L	7:34	7:34	7:34	7:34	7:36	8:52	10:08	11:24	11:24
10	9:26	239	2.374 L	9:26	9:26	9:26	9:53	11:52	13:51	15:49	17:48	17:48
12	11:20	199	3.418 L	11:20	11:20	11:24	14:15	17:05	19:56	22:47	25:38	25:38
15	14:10	159	5.342 L	14:10	14:10	17:48	22:15	26:42	31:09	35:36	40:04	40:04
18	17:00	133	7.692 L	17:00	19:13	25:38	32:03	38:27	44:52	51:16	57:41	57:41
21	19:50	114	10.470 L	19:50	26:10	34:54	43:37	52:21	61:00	69:48	78:31	78:31
24	22:40	99	13.674 L	22:47	34:11	45:34	56:58	68:22	79:46	91:10	102:33	102:33
27	25:30	88	17.306 L	28:51	43:16	57:41	72:07	86:32	100:57	115:22	129:48	129:48
30	28:20	80	21.366 L	35:37	53:25	71:13	89:02	106:50	124:38	142:26	160:15	160:15
33	31:10	72	25.852 L	43:05	64:38	86:10	107:43	129:16	150:43	172:21	193:53	193:53
36	34:00	66	30.768 L	51:17	76:55	102:34	128:12	153:50	179:29	205:07	230:46	230:46

TABLE 2 Minimum Specified Time Required for a 0.5 psig Pressure Drop for Size and Length of Pipe Indicated for Q = 0.0015

NOTE 1—Consult with pipe and appurtenance manufacturer for maximum test pressure for pipe size greater than 30 in. in diameter.

Pipe Diameter, in.	Minimum Time, min:s	Length for Minimum Time, ft	Time for Longer Length, s	Specification Time for Length (L) Shown, min:s								
				100 ft	150 ft	200 ft	250 ft	300 ft	350 ft	400 ft	450 ft	
4	1:53	597	0.190 L	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53
6	2:50	398	0.427 L	2:50	2:50	2:50	2:50	2:50	2:50	2:51	3:12	3:12
8	3:47	298	0.760 L	3:47	3:47	3:47	3:47	3:48	4:26	5:04	5:42	5:42
10	4:43	239	1.187 L	4:43	4:43	4:43	4:57	5:56	6:55	7:54	8:54	8:54
12	5:40	199	1.709 L	5:40	5:40	5:42	7:08	8:33	9:58	11:24	12:50	12:50
15	7:05	159	2.671 L	7:05	7:05	8:54	11:08	13:21	15:35	17:48	20:02	20:02
18	8:30	133	3.846 L	8:30	9:37	12:49	16:01	19:14	22:26	25:38	28:51	28:51
21	9:55	114	5.235 L	9:55	13:05	17:27	21:49	26:11	30:32	34:54	39:16	39:16
24	11:20	99	6.837 L	11:24	17:57	22:48	28:30	34:11	39:53	45:35	51:17	51:17
27	12:45	88	8.653 L	14:25	21:38	28:51	36:04	43:16	50:30	57:42	64:54	64:54
30	14:10	80	10.683 L	17:48	26:43	35:37	44:31	53:25	62:19	71:13	80:07	80:07
33	15:35	72	12.926 L	21:33	32:19	43:56	53:52	64:38	75:24	86:10	96:57	96:57
36	17:00	66	15.384 L	25:39	38:28	51:17	64:06	76:55	89:44	102:34	115:23	115:23

END OF SECTION 33-31-00

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SECTION 33-40-00 - STORM DRAINAGE

PART 1- GENERAL

1.01 DESCRIPTION OF WORK

WORK under this section includes the furnishing of all labor, EQUIPMENT and MATERIALS and performing all excavation, backfilling, casting and incidental WORK in connection with the construction of drainage pipe, drainage structures, and related appurtenances in conformance with the specifications and the lines, grades, notes and cross-sections shown in the plans and as directed by the ENGINEER.

1.02 MATERIALS

The pipe MATERIALS shall be as specified in the **F.D.O.T. Standard Specifications for Road and Bridge Construction, Division II and III**, unless otherwise specified on plans.

- A. Precast Concrete Pipe and Structures - **F.D.O.T. - Section 449**.

RCP - Reinforced Concrete Pipe
ERCP - Elliptical Reinforced Concrete Pipe

- B. Corrugated Metal Pipe and Pipe Arch - **F.D.O.T. - Section 943** shall be as follows:

15" to 24" -- 16 Gage
30" to 36" -- 14 Gage
42" to 54" -- 12 Gage
60" to 72" -- 10 Gage
78" to 96" -- 8 Gage

CMP - Corrugated Metal Pipe
CMPA - Corrugated Metal Pipe Arch
BCCMP - Bituminous Coated Corrugated Metal Pipe

- C. Corrugated Aluminum Pipe & Pipe Arch - **F.D.O.T. - Section 945**

- D. Miscellaneous Types of Pipe – **F.D.O.T. – Section 948**

- E. Pipe Gaskets - **F.D.O.T. - Section 942**

1.03 EXCAVATION

- A. General - The CONTRACTOR shall perform all excavation of every description and of whatever substances encountered to the depths indicated on the drawings, or as necessary. Excavation shall be unclassified regardless of MATERIAL encountered. This shall include all necessary clearing and grubbing of any foreign substance encountered within the structure or trench area. No separate payment for excavation as such will be made. The cost thereof shall be included in the prices for the pipe installation. Excavated MATERIAL suitable for backfill shall be piled in an orderly manner at a sufficient distance from the trench to avoid overloading and to prevent slides or cave-ins.

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Except in rock and water bearing earth, mechanical excavation shall be limited for four inches above the elevation of the pipe invert. All additional excavation shall be made manually. Excavation in rock shall be made by a method approved by the ENGINEER.

All muck below storm drain pipes and structures shall be completely removed to the width of trenches at the pipe and to the depths where sand or other acceptable MATERIAL is encountered. After removal of all muck, the trench shall be filled to above the invert of the pipe with select fill placed and tamped in six-inch layers. The top six inches under, and to four inches above the invert, shall be compacted to not less than 100% of the maximum density as determined by AASHTO Method T-99. Fill MATERIAL shall be as elsewhere specified.

The CONTRACTOR shall dispose of the excavated MATERIALS not required or suitable for backfill as directed by the ENGINEER, and shall perform such grading as may be necessary to prevent surface water from flowing into the trenches. Haul for disposal of MATERIAL will be the responsibility of the CONTRACTOR.

Sheeting and shoring shall be installed as may be necessary for the protection of the WORK for the preservation of ad-joining property and structures, and for the safety of the employees. Unless otherwise indicated, excavation shall be by open cut, except that short sections of a trench may be tunneled if, in the opinion of the ENGINEER, the pipe can be safely and properly installed and backfill can be properly compacted in such tunnel sections.

The CONTRACTOR shall provide adequate EQUIPMENT for the removal of storm or subsurface waters which may accumulate in the excavated areas. If subsurface water is encountered, the CONTRACTOR shall utilize approved means to adequately dewater the excavation so that it will be dry for working and pipe laying. A well point system or other approved dewatering method shall be utilized if necessary to maintain the excavation in a dry condition for preparation of the trench bottom and for pipe laying. All exiting improvements such as pavements, conduits, poles, pipes and other structures shall be carefully supported and fully protected from injury, and in case of damage they shall be restored without compensation.

Existing UTILITIES and other underground obstructions are shown on the plans, but the accuracy of the location and depths are not guaranteed. The CONTRACTOR shall be responsible for damages to these existing UTILITIES and shall in case they are damaged, restore them to their original condition.

- B. Trench Excavation - Trench excavation ahead of pipe laying shall not exceed 300 feet, or the distance between inter-sections. Trenches shall be excavated to such width as may be necessary for proper laying of the pipe with banks as nearly vertical as practicable. The bottom of trenches shall be accurately graded to provide uniform bearing on undisturbed soil for the entire length of each section of pipe, except where it is necessary to excavate for pipe bells and for the proper sealing of joints. Bell holes and depressions for joints shall be excavated after the trench bottom has been graded and such holes and depressions shall not be made larger than is necessary for properly making the particular type of joint. The width of the trench at and below the top of the pipe shall not be greater than necessary to permit satisfactory jointing and thorough tamping of the backfill around the pipe. The width of the trench above the level may be as wide as necessary for sheeting and bracing and the proper performance of the WORK. The bottom of the trench shall be rounded so that the bottom quadrant of the pipe will rest firmly on undisturbed soil for as nearly the full length of the barrel as proper jointing operations will permit. This part of the excavation shall be done manually only a few feet in advance of the pipe laying by men skilled in this type of WORK. Unauthorized overdepths shall be backfilled with loose granular, moist earth, thoroughly tamped. Whenever the presence of incipient slides is noted during excavation, the trench walls shall be restrained with

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adequate sheeting, shoring and bracing. Trench excavation in the proximity of certain existing sanitary sewers and other UTILITY lines shall be protected by either steel or wood sheeting. Used sheet piling in good condition which has been inspected and approved by the ENGINEER may be used in place of new sheet piling.

- C. Removal of Rock - Where rock is encountered, it shall be removed or replaced with suitable selected MATERIALS in such manner as to provide a compacted earth cushion having a thickness under the pipe of not less than one-half inch per foot height of fill over the top of the pipe, with a minimum thickness of eight inches. Where bell and spigot pipe is used, the eight-inch cushion shall be maintained under the bell, as well as under the straight portion of the pipe.
- D. Removal of Unstable MATERIAL - It is the intent of this specification that all pipe and other structures shall be provided with a stable foundation and that any MATERIAL which by reason of kind or condition is not or cannot be made stable by drainage or compaction shall be removed and replaced. Therefore, any MATERIAL encountered at the elevation indicated on the drawings or specified for pipe that will not or cannot be improved to provide a stable foundation for the pipe, shall be removed and replaced. All unstable MATERIAL below the grade line of the pipe shall be removed for the full width of the trench and replaced with suitable selected MATERIAL, compacted as specified elsewhere in the specifications. For the purpose of this specification, muck, peat and other highly organic soils shall be considered to be unstable MATERIALS; also any soil which is, or might become wet to such a degree that its moisture content is equal to or greater than ninety percent (90%) of its liquid limit will have to be specifically approved by the ENGINEER with regard to stability or shall be considered to be any unstable MATERIAL requiring removal and replacement.
- E. Bedding - The bedding surface for the pipe shall provide a firm foundation of uniform density throughout the entire length of the pipe. The pipe shall be carefully bedded in a soil foundation that has been accurately shaped and rounded to conform to the lowest one-fourth of the outside circular portion of the pipe for its entire length, and when necessary shall be tamped to secure uniform, firm support. Where bell and spigot pipe is used, the bell holes shall be deep enough to insure that the bell does not bear on the bottom of the direction of the culvert or storm drain.
- F. Other Structures - Excavation shall be carried to the depths indicated, and shall conform to the shape of the structure with sufficient allowance for setting forms, inspection and proper performance of the WORK.

1.04 INSTALLATION OF PIPE

- A. General - Piping and appurtenances for sewers shall be of the type and MATERIAL specified in the applicable sections of the Detailed Specifications. All pipe, fittings, jointing, MATERIALS, grates, manhole frames and covers, and other appurtenances shall be new MATERIAL to be included in the WORK and if not specifically described in these specifications, shall be of the best quality and entirely suitable for the service intended. All such MATERIAL shall be approved by the ENGINEER prior to installation.
- B. Laying Pipe - Pipe shall be protected during storage and handling against impact shocks or free fall. Pipe shall be kept clean at all times, and no pipe shall be used that does not conform fully with standards or specifications herein after described.

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Each pipe section shall be laid in strict conformance with the line and grade shown on the plans, and in the presence of the inspector. Three batter boards and a top line shall be used when pipe is laid, unless another method of checking the invert grade is approved by the ENGINEER. The laying of pipe in finished trenches shall commence at the lowest point.

The CONTRACTOR shall provide and maintain on the job site at all times, a gauge rod of sufficient length to reach from the invert of the pipe being laid to the top line secured on the batter boards. The gauge rod shall be graduated and numbered each foot of its entire length, and shall be equipped with either a plumb line or two spirit levels.

Joints shall be sealed in accordance with the recommendations of the pipe and gasket manufacturer.

1.05 BACKFILLING

- A. Under Pipe - Trenches shall be backfilled by hand from the bottom of the trench to the center line of the pipe with predominantly sandy MATERIAL free from rocks or stones, placed in four-inch layers and compacted thoroughly with curved end tamping bars under and on each side of the pipe and flat tampers between pipe and wall of trench. Back-filling MATERIAL shall be deposited in the trench for its full width on each side of the pipe, fittings and appurtenances simultaneously.
- B. Over Pipe - From the centerline of the pipe, fittings and appurtenances, to an elevation one foot above the top of the pipe, the trench shall be backfilled by hand or by approved mechanical methods. The backfill MATERIAL shall be as specified in A above, and shall be consolidated by puddling with water or by use of tampers. In areas where there are no paved or hard surfaced roads where settlement is unimportant, the CONTRACTOR may backfill the trench from an elevation one foot above the pipe to the top of the trench with the excavated MATERIAL and shall be neatly rounded over the trench area to sufficient height to allow for settlement to grade after consolidation.
- C. Under Pavement - Where the excavation is made through pavements, or in areas to be paved in this CONTRACT, curbs, driveways or sidewalks or where such structures are undercut by the excavation, the entire backfill to the subgrade of pavement or structures shall be made with predominantly sand MATERIAL free from rocks, stones or vegetable matter, except that rocks passing a three and one-half inch ring will be permitted in the backfill between the elevation one foot above the top of the pipe, and the bottom of the pavement.

The entire backfill MATERIAL, including the MATERIAL placed around and one foot above the pipe, shall be compacted to a density of not less than 100% of the maximum density, as determined by AASHTO T-99. Compaction shall be done by means of rapid striking mechanical tampers or other approved methods.

1.06 CASTING

- A. Gray iron casting (including frames and grates) shall conform with the requirements of F.D.O.T. Standard Specification, Section 962-8.

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1.07 PUMPING

- A. Unless specifically authorized by the ENGINEER, all pipe shall be laid in the dry, and the CONTRACTOR shall do such pumping as is required for proper execution of the WORK and to dispose of the water without damage or undue inconvenience of the WORK, the surrounding area or the public. He shall not dam, divert, or cause water to flow in excess in existing gutters, pavements or other structures, and to this end may be required to conduct the water to a suitable place of discharge. No separate payment for pumping as such will be made. The cost thereof shall be included in the price for pipe installations. Wellpoint system or other approved EQUIPMENT shall be used to maintain excavations in a dry condition for pipe laying.

1.08 INLETS & MANHOLES

- A. Inlets and manholes shall be installed at locations shown on the plans. Concrete, reinforcement steel and forms shall conform to the requirements set forth in the Specifications for concrete.

All castings shall be of the type and size as shown on the plans and as specified herein. Gray iron castings (including frames and grates) shall conform with the requirements of **F.D.O.T. Standard Specifications, Section 962-8.**

- B. Endwalls shall be installed at locations shown on the plans. Concrete, reinforcement steel and form shall conform to the requirements set forth in the specifications for Concrete and **F.D.O.T. Specifications.** Concrete endwalls shall be combined with embankment protection as set forth in the plans and in the specifications for Rip-Rap.

END OF SECTION 33-40-00