Project Manual

Palmetto Park & Ride

Palmetto, Florida

for

Manatee County Government
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Bradenton, Florida

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Construction Documents

Book 1 of 1

- **Divisions 01 thru 33**

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Division 01

General Requirements

SECTION 01 31 13
PROJECT COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies administrative and supervisory requirements necessary for Project coordination including, but not necessarily limited to:

1. Coordination.
2. Administrative and supervisory personnel.
3. General installation provisions.
4. Cleaning and protection.

B. Progress meetings, coordination meetings and pre-installation conferences are included in Section 01 31 19, Project Meetings.

C. Requirements for the Contractor's Construction Schedule are included in Section 01 33 00, Submittals.

1.2 COORDINATION

A. Coordination: The Contractor shall coordinate construction activities included under various Sections of these Specifications to assure efficient and orderly installation of each part of the Work. Coordinate construction operations included under different Sections of the Specifications that are dependent upon each other for proper installation, connection, and operation.

1. Where installation of one part of the Work is dependent on installation of other components, either before or after its own installation, schedule construction activities in the sequence required to obtain the best results.
2. Where availability of space is limited, coordinate installation of different components to assure maximum accessibility for required maintenance, service and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. Where necessary, prepare memoranda for distribution to each party involved outlining special procedures required for coordination. Include such items as required notices, reports, and attendance at meetings.

1. Prepare similar memoranda for the Owner and separate contractors and subcontractors where coordination of their Work is required.

C. Administrative Procedures: The Contractor shall coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of schedules.

2. Installation and removal of temporary facilities.
3. Delivery and processing of submittals.
4. Progress meetings.
5. Project Close-out activities.

D. Conservation: The Contractor shall coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.

1. Salvage materials and equipment involved in performance of, but not actually incorporated in, the Work. Refer to other sections for disposition of salvaged materials that are designated as Owner's property.

1.3 SUBMITTALS

A. Coordination Drawings: The Contractor shall prepare and submit coordination Drawings where close and careful coordination is required for installation of products and materials fabricated off-site by separate entities, and where limited space availability necessitates maximum utilization of space for efficient installation of different components.

1. Show the interrelationship of components shown on separate Shop Drawings.
2. Indicate required installation sequences.
3. Comply with requirements contained in Section 01 33 00, Submittals.

B. Staff Names: Within 15 days of Notice to Proceed, submit a list of the contractor's principal staff assignments, including the Superintendent and other personnel in attendance at the site; identify individuals, their duties and responsibilities; list their addresses and telephone numbers.

1. Post copies of the list in the Project meeting room, the temporary field office, and each temporary telephone.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION PROVISIONS

A. Inspection of Conditions: Require the Installer of each major component to inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.

B. Manufacturer's Instructions: Comply with manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents.

C. Inspect materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items.

D. Provide attachment and connection devices and methods necessary for securing Work. Secure Work true to line and level. Allow for expansion and building movement.

E. Visual Effects: Provide uniform joint widths in exposed Work. Arrange joints in exposed Work to obtain the best visual effect. Refer questionable choices to the Architect for final decision.

F. Recheck measurements and dimensions, before starting each installation.

G. Install each component during weather conditions and Project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible material as necessary to prevent deterioration.

H. Coordinate temporary enclosures with required inspections and tests, to minimize the necessity of uncovering completed construction for that purpose.

I. Mounting Heights: Where mounting heights are not indicated, install individual components at standard mounting heights recognized within the industry for the particular application indicated. Refer questionable mounting height decisions to the Architect for final decision.

3.2 CLEANING AND PROTECTION

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

B. Clean and maintain completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

C. Limiting Exposures: Supervise construction activities to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period. Where applicable, such exposures include, but are not limited to, the following:

1. Excessive static or dynamic loading.
2. Excessive internal or external pressures.
3. Excessively high or low temperatures.
4. Thermal shock.
5. Excessively high or low humidity.
6. Air contamination or pollution.
7. Water or ice.
8. Solvents.
9. Chemicals.
10. Light.

11. Radiation.
12. Puncture.
13. Abrasion.
14. Heavy traffic.
15. Soiling, staining and corrosion.
16. Bacteria.
17. Rodent and insect infestation.
18. Combustion.
19. Electrical current.
20. High speed operation,
21. Improper lubrication,
22. Unusual wear or other misuse.
23. Contact between incompatible materials.
24. Destructive testing.
25. Misalignment.
26. Excessive weathering.
27. Unprotected storage.
28. Improper shipping or handling.
29. Theft.
30. Vandalism.

D. Refer to Section 01 74 13 for additional construction cleaning requirements.

END OF SECTION 01 31 13

SECTION 01 31 19
PROJECT MEETINGS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies administrative and procedural requirements for project meetings including but not limited to:

1. Pre-Construction Conference.
2. Pre-Installation Conferences.
3. Coordination Meetings.
4. Progress Meetings.

B. Construction schedules are specified in another Division-1 Section.

C. The Contractor will be required to attend a monthly meeting with the Owner and Architect. Subcontractors will not be required to attend this monthly meeting.

1.1 PRE-CONSTRUCTION CONFERENCE

A. The Contractor and Architect shall schedule a pre-construction conference and organizational meeting at the Project site or other convenient location no later than 15 days after execution of the Agreement and prior to commencement of construction activities. Conduct the meeting to review responsibilities and personnel assignments.

B. Attendees: The Owner, Architect and their consultants, the Contractor and its superintendent, major subcontractors, manufacturers, suppliers and other concerned parties shall each be represented at the conference by persons familiar with and authorized to conclude matters relating to the Work.

C. Agenda: Discuss items of significance that could affect progress including such topics as:

1. Tentative construction schedule.
2. Critical Work sequencing.
3. Designation of responsible personnel.
4. Procedures for processing field decisions and Change Orders.
5. Procedures for processing Applications for Payment.
6. Distribution of Contract Documents.
7. Submittal of Shop Drawings, Product Data and Samples.
8. Preparation of record documents.
9. Use of the premises.

    a. Owner's requirements.

10. Office, Work and storage areas.
11. Equipment deliveries and priorities.
12. Safety procedures.
13. First aid.

14. Security.
15. Housekeeping.
16. Working hours.

1.2 PRE-INSTALLATION CONFERENCES

A. The Contractor shall conduct pre-installation conferences at the site before each construction activity that requires coordination with other construction and/or as may be specified in the technical specification sections. The Installer and representatives of manufacturers and fabricators involved in or affected by the installation, and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise the Architect of scheduled meeting dates.

1. Review the progress of other construction activities and preparations for the particular activity under consideration at each pre-installation conference, including requirements for:

a. Contract Documents.
b. Options.
c. Related Change Orders.
d. Purchases
e. Deliveries.
f. Shop Drawings, Product Data and quality control Samples.
g. Possible conflicts.
h. Compatibility problems.
i. Time schedules.
j. Weather limitations.
k. Manufacturer's recommendations.
l. Compatibility of materials.
m. Acceptability of substrates.
n. Temporary facilities.
o. Space and access limitations.
p. Governing regulations.
q. Safety.
r. Inspection and testing requirements.
s. Required performance results.
t. Recording requirements.
u. Protection.

2. Record significant discussions and agreements and disagreements of each conference, along with the approved schedule. Distribute the record of the meeting to everyone concerned, promptly, including the Owner and Architect.

3. Do not proceed if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of Work and reconvene the conference at the earliest feasible date.

1.3 COORDINATION MEETINGS

A. The Contractor shall conduct Project coordination meetings at regularly scheduled times convenient for all parties involved, and as may be specified in the technical specification sections. Project coordination meetings are in addition to specific meetings held for other purposes, such as regular progress meetings and special pre-installation meetings.

1. Earthwork/underground utilities.
2. Excavation/concrete footings, piers, foundations.
3. Concrete slabs on grade, underslab vapor retarder.
5. Concrete slabs on grade, isolation joint placement/details, underfloor utilities/recesses for resilient flooring/polished concrete..
6. Precast concrete walls/windows, doors, curtain wall.
7. Structural steel/precast concrete.
8. Steel, roof decks/roof system, insulation and flashings.
9. Lay-in ceiling systems, gypsum board ceiling and suspension systems/wall construction, lights, A/V, HVAC, plumbing.
10. Finishes/painting/linoleum/polished concrete.
11. Fire rated wall/floor construction/firestopping, fire dampers/rated door assemblies.

B. Request representation at each meeting by every party currently involved in coordination or planning for the construction activities involved.

C. Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

D. The Contractor shall prepare Coordination Meeting Minutes and submit to all attendees and project related personnel and the Owner and Architect within three (3) days after the coordination meeting.

1.4 PROGRESS MEETINGS

A. The Contractor shall conduct progress meetings at the Project site at regularly scheduled intervals (minimum of one every two weeks). Notify the Owner and Architect of scheduled meeting dates. Coordinate dates of meetings with preparation of the payment request. Meetings shall be held once every two weeks at a minimum. Additional meetings may be required near the end or at special intervals during the project construction. The Architect or Owner may request these additional meetings and they shall be attended at no additional cost to the Contract.

B. Attendees: In addition to representatives of the Owner and Architect, each Contractor, subcontractor, supplier or other entity concerned with current progress or involved in planning, coordination or performance of future activities shall be represented at these meetings by persons familiar with the Project and authorized to conclude matters relating to progress.

C. Agenda: Review and correct or approve minutes of the previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to the current status of the Project.

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

2. Review the present and future needs of each entity present, including such items as:

a. Interface requirements.
b. Time.
c. Sequences.
d. Deliveries.
e. Off-site fabrication problems.
f. Access.
g. Site utilization.
h. Temporary facilities and services.
i. Hours of Work.
j. Hazards and risks.
k. Housekeeping.
l. Quality and Work standards.
m. Change Orders.
n. Documentation of information for payment requests.

D. Reporting: No later than 3 days after each progress meeting date, the Contractor shall distribute copies of minutes of the meeting to each party present and to other parties who should have been present. Include a brief summary, in narrative form, of progress since the previous meeting and report.

1. Schedule Updating: The Contractor shall revise the construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue the revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01 31 19

SECTION 01 33 00
SUBMITTALS

PART 1 - GENERAL

1.1 SUBMITTAL PROCEDURES

A. Submittals, including those specified herein to be submitted to the Architect, excluding those directed to a specific individual, shall be submitted directly to the Contractor for his review. Contractor will forward required submittals to the Architect for his review and approval.

1. **Contractors shall submit shop drawings in electronic format.** All electronic format drawing submittals shall be in Adobe Acrobat pdf format. All electronic format product data or other information shall be submitted in Adobe Acrobat pdf format. Coordinate with Architect prior to submitting.

B. Contractors on this Project shall provide submittals in accordance with the requirements of this Section. Where a submittal is required by a Contractor but assistance from others, Contractors shall participate and cooperate to expedite each submittal.

C. Where submission of samples, shop drawings, or other items are required from suppliers or subcontractors, it shall be the responsibility of the Contractor for whom the subcontractor is executing the Work to see that the submittal items required are complete and properly submitted, and corrected and resubmitted at the time and in the order required so as not to delay the progress of the Work. Submittals shall be made through the Contractor.

D. The Contractor shall check all shop drawings, samples, and other submittals and submit them to the Architect with a letter of transmittal giving his approval, comments, and suggestions. Each transmittal shall include the following information:

1. Date Submitted.
2. Project title and number.
3. Contractor's name and address.
4. **Identification by Specification Section and quantity submitted for each submittal including name of subcontractors, manufacturer, or supplier.**
5. Notification of deviations from the Contract Documents for each submittal.
6. Contractor's written approval marked on each submittal. If contractor's submittals are not stamped and reviewed by the contractor prior to submitting for review, submittals will be sent back to the contractor.
7. If there is more than one building in the project, shop drawings are to be submitted and packaged for each building and submitted in packages for each separate building. Shop drawings not submitted in this fashion may be rejected.

E. The Contractor shall prepare, review, and stamp with his approval and submit, with reasonable promptness or within the specified time periods and in orderly sequence so as to cause no delay in the Work or in the Work of another contractor, submittals required by these Contract Documents or subsequently required by modifications.

1. If the product is not as specified or approved by Addenda, it will be rejected by the Owner. Contractor shall not make submittals if the product manufacturer is not specified or listed in the Addenda. This will delay the submittal process and the contractor shall assume full responsibility for any delays caused by unapproved manufacturer submittals.

F. The Contractor and Owner shall review and take action on submittals with reasonable promptness, so as to cause no delay in the progress. A reasonable period of time for review of and action taken on submittals shall be as specified herein, but in no case shall it be more than 14 calendar days from the time it is received by the Owner until the time the submittal is marked and forwarded or returned. Contractors shall allow sufficient mailing time for submittals.

G. The same submittal will only be reviewed a maximum of two (2) times. If the same submittal is not correct within the two (2) submittal limit for the same item, the contractor will be charged for the additional reviews required.

H. Identification of Submittals: Submittals, including re-submittals, shall be numbered with a Submittal Number. The Submittal Number shall consist of the applicable specification section number followed by a suffix number in consecutive order matching the numbers on the Submittal Log. The form of Submittals Numbers shall be as follows: ## ## ## - ### (example: 09 90 01-01).

1.2 REQUIRED SUBMITTALS

A. Construction Schedules

1. A linear bar chart time control schedule shall be provided by the Contractor.

a. Each Contractor shall work overtime nights, and weekends, if necessary to maintain his portion of the schedule at no additional cost to the Owner.
b. Each Contractor is responsible to expedite approvals and deliveries of material so as not to delay job progress.
c. Each Contractor shall begin each phase of his work as quickly as physically possible, but not to impede or jeopardize the Work of other Contractors.
d. Each Contractor shall cooperate fully with the Contractor in the coordination of the Work with other Contractors and the convenience of the Owner as indicated in the Specifications.
e. Each Contractor shall participate in the updating of the schedule on a bi-weekly basis during the entire life of his contract.

1) Contractor's schedule shall be updated bi-weekly and submitted to the Architect and other involved parties at least 2 days prior to the bi-weekly progress meeting.

f. The Project Construction Schedule will be updated reflecting Contractor's revised schedule and progress meeting results.

B. Schedule of Values

1. Contractor shall prepare and submit to the Owner a Schedule of Values for approval within 7 days after notice is given to proceed with Work. The Schedule of Values shall consist of a complete breakdown of the Contractor's contract sum showing the various items of the Work, divided so as to facilitate the approval of payments to the Contractor for Work completed. In addition to and conjunctive with the division of various items of work, the breakdown shall separate individual buildings within the Project, shall separate sitework from building(s) components and shall separate remodeling/renovation work from new construction work. The Schedule of Values shall be prepared on AIA Document G703, Continuation Sheet, showing the breakdown of items of Work and supported by such data to substantiate its correctness as the Architect may require.
2. Schedule of Values shall be coordinated with the Construction Schedules such that the percentages of Work completed closely relates to the values for the Work shown on the request for payments. At the beginning of the Project, each Contractor shall prepare a schedule of monthly progress payments showing the amount the Contractor may require for the Work proposed to be completed. The purpose of this schedule is to allow the Owner to determine what amounts of funds he will be required to have available each month during the progress of construction for progress payments.

C. Project Use Site Plan

1. The Contractor, in cooperation with other Contractors on this Project, shall prepare a proposed project use of the site plan.
2. Contractors shall confine operations at the site to areas within the areas indicated and as approved on the use of the site plan, and as permitted by law, ordinances, and permits. Site shall not be unreasonably encumbered with materials, products, or construction equipment.

D. Shop Drawings and Product Data

1. Shop drawings are drawings, diagrams illustrations, schedules, performance charts, brochures, and other data which are prepared by the Contractor or subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.

    a. Advertising brochures will not be accepted as shop drawings.
    b. Erection and setting drawings as referred to in these Specifications will be considered as shop drawings and shall be submitted along with detailed shop drawings.
    c. Where schedules are required to indicate locations, they shall be submitted as part of the shop drawing package for that item.
    d. Shop drawings and schedules shall repeat the identification shown on the Contract Drawings.

2. Product data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate a material, product, or system for some portion of the Work.

a. Clearly mark each copy to identify pertinent materials.
b. Show dimensions and clearance required.
c. Show performance and characteristics and capacities.
d. Show wiring diagrams and controls.
e. Note variances from the Contract Documents including manufacturer's recommended changes to sequencing and to piping and control diagrams.

3. Preparation of Submittals: Provide permanent marking on each submittal to identify project, date, Contractor, Subcontractor, submittal name, and similar information to distinguish it from other submittals. Show Contractor's executed review and approval marking and provide space for Architect's "Action" marking. Package each submittal appropriately for transmittal and handling. Submittals which are received from sources other than through the Contractor will be returned "without action", which does not mean approval.
4. By approving and submitting shop drawings, the Contractor thereby represents that he has determined and verified field measurements, field construction criteria, materials, catalog numbers, and similar data, and that he has checked and coordinated each shop drawing with the requirements of the Work and of the Contract Documents prior to submitting to the Architect.
5. The Contractor shall make corrections required by the Architect and shall resubmit the required number of corrected copies of shop drawings until approved. The Contractor shall direct specific attention in writing or on resubmitted shop drawings to revisions other than the corrections requested by the Architect on previous submissions.
6. The Architect will review shop drawings only for conformance with the design concept of the Project and with the information given in the Contract Documents. The Architect's review of a separate item shall not indicate review of an assembly in which the item functions.
7. The Architect's review of shop drawings shall not relieve the Contractor of responsibility for any deviation from the requirements or the Contracts documents unless the Contractor has informed the Architect in writing of such deviation at the time to submission and the Architect has given written approval to the specific deviation, nor shall the Architect's action relieve the Contractor from responsibility for errors or omissions in the shop drawings.
8. Notations and remarks added to shop drawings by the Architect are to insure compliance to Drawings and Specifications and do not imply a requested or approved change to contract cost.
9. Should deviations, discrepancies, or conflicts between shop and contract drawings and Specifications be discovered, either prior to or after review, Contract Documents shall control and be followed.

Schedule of Required Shop Drawings and Product Data

10. Architectural/Structural/Mechanical/Electrical/Civil

a. Upload to ftp site as instructed by the Architect.

11. Shop drawings will be marked as follows: Contractors shall take the following action for each respective marking:

a. "REVIEWED AND RELEASED" - Copies will be distributed as indicated under above schedule.
b. "REVIEWED AND RELEASED WITH CORRECTIONS" - Contractor may proceed with fabrication, taking into account the necessary corrections. Corrected shop drawings shall be resubmitted before fabrication of this Work is completed. Only shop drawings marked "REVIEWED AND RELEASED" by Architect will be permitted on the project site.
c. "REVISE AND RESUBMIT" - Contractor will be required to resubmit shop drawings in their entirety. No fabrication or installation shall be started until shop drawings so marked have been completely revised, resubmitted, and marked by Owner according to preceding Paragraphs 1. or 2.

12. Where re-submittal is required, submittal and distribution shall be as specified in subparagraph 11 above.
13. One set of shop drawings marked by Owner "REVIEWED AND RELEASED" be filed on the project site at all times. Shop drawing file may be electronic and accessible by the Architect and Owner on the on-site project computer. No installation of equipment, materials, or products is to be incorporated into the Project until shop drawings marked by Architect "REVIEWED AND RELEASED" have been received on the Project.

E. Samples

1. The Contractor shall submit to the Owner triplicate (3) samples to illustrate materials or workmanship, colors, and textures, and establish standards by which the Work will be judged. A complete list of required samples will be submitted to the Contractor for use as a check list.
2. By approving and submitting samples, the Contractor thereby represents that he has determined and verified materials, catalog numbers, and similar data, and that he has checked and coordinated each sample with the requirements of the Work and of the Contract Documents prior to submitting to the Architect.
3. The Contractor shall resubmit the required number of correct or new samples until approved. The Contractor shall direct specific attention in writing or on resubmitted samples to revisions other than the changes requested by the Architect on previous submissions.
4. The Owner will review samples but only for conformance with the design concept of the Project and with the information given in the Contract Documents. The Owner’s approval of a separate item shall not indicate approval of an assembly in which the item functions.
5. The Owner 's action shall not relieve the Contractor of responsibility for deviations from the requirements of the Contract Documents unless the Contractor has informed the Architect in writing of the deviation at the time of submission and the Architect has given written approval to the specific deviation, nor shall the Architect's action relieve the Contractor form responsibility for errors or omissions in the samples.
6. Unless otherwise specified, samples shall be in triplicate and of adequate size to show function, equality, type, color, range, finish, and texture of material. When requested, full technical information and certified test data shall be supplied.

a. Each sample shall be labeled, bearing material name and quality, the Contractor's name, date, project name, and other pertinent data.
b. Transportation charges to and from the Architect's office must be prepaid on samples forwarded. Approved samples shall be retained by the Architect until the Work for which they were submitted has been accepted.

7. Materials shall not be ordered until approval is received. Materials shall be furnished, equal in every respect to approved samples. Where color or shade cannot be guaranteed, the maximum deviation shall be indicated by the manufacturer. Work shall be in accordance with the approved samples.

F. List of A.I.A. Documents (Contractors Source)

1. The following documents are required in the Project Manual to be furnished and executed by the Contractor(s) and submitted to the Architect at various stages of the Project Work. Refer to Supplementary Conditions and Division 1.

G702 - Application and Certification for Payment
G703 - Continuation Sheet
G705 - Certificate of Insurance
G706 - Contractor's Affidavit of Payment of Debt and Claims
G706A - Contractor's Affidavit of Release of Liens
G707 - Consent of Surety Company to Final Payment, if required
G707A - Consent of Surety to Reduction in or Partial Release of Retainage, if required.

2. Special documents, which may be required, will be furnished by the Architect.

G. Operation and Maintenance Data

1. Typed or printed instruction covering the operation and maintenance of each item of equipment furnished, shall be prepared and place in a notebook by the Contractor and submitted to the Architect for review and transmittal to the Owner. The instructions, as applicable, shall include the following:

a. Any schematic piping and wiring diagrams;
b. Any valve charts and schedules;
c. Any lubrication charts and schedules;
d. Guides for troubleshooting;
e. Pertinent diagrams of equipment with main parts identification;
f. Manufacturer's data on all equipment;
g. Operating and maintenance instructions for all equipment;
h. Manufacturer's parts list; and,
i. Any testing procedures for operating tests.

(1) Three (3) copies of the above instruction books shall be furnished prior to Final Payment. The books shall describe the information to be covered clearly and in detail and shall be in form and content satisfactory to the Owner.

2. The Contractor shall instruct the Owner's operating personnel in the proper use, care and emergency repair of all equipment installed by it before Final Payment. The Contractor shall call particular attention to any safety measures that should be followed. The instruction shall be adequate to train the Owner's operating personnel in the proper use, care and emergency repair of such equipment.
3. Also submit all Operation and Maintenance Manuals in pdf format.

H. The work shall be furnished and installed in accordance with the Drawings, Specifications and as additionally required by the manufacturer's instructions, and where a conflict occurs between the Drawings or Specifications and the manufacturer's instructions, the contractor shall request clarification from the Architect prior to commencing the work and shall follow the interpretations given by the Architect.

1.3 MATERIAL SAFETY DATA SHEETS

A. In compliance with the OSHA Hazard Communication Standard (1910.1200, 08-24-1987) contractors are required to have on the site, MSDS (Material Safety Data Sheets) for ALL products classified as hazardous that their firm has knowledge that they will be furnishing, using, or storing on the jobsite during the duration of this Project. MSDS sheets are not part of the shop drawing review process.

1. The Contractor at completion of the Work shall provide the Owner with the MSDS sheets for the hazardous products used on the Project site during construction.

PART 2 - PRODUCTS (NOT USED).

PART 3 - EXECUTION (NOT USED).

END OF SECTION 01 33 00

SECTION 01 50 00
TEMPORARY FACILITIES

PART 1 - GENERAL

1.1 REFERENCE

A. All applicable requirements of other portions of the Contract Documents apply to the Work of this Section.

1.2 GENERAL

A. Furnish labor, materials, tools, equipment, and services for temporary facilities, including maintenance and their subsequent removal, in accordance with provisions of the contract Documents and as required for the progress and completion of the Project.

B. Pay applicable costs unless specifically stated otherwise.

C. Coordinate temporary facilities work with other trades and the Owner. Rerouting or relocation expenses shall be paid by the responsible Contractor doing the Work if the temporary work has not been coordinated with other trades and the Owner. Routing or relocations of temporary facilities shall also be reviewed by the Architect and Owner before installation.

D. Provide, maintain, and remove supplementary or miscellaneous item, appurtenances, and devices incidental to, or necessary for, a sound, secure, and complete installation.

E. Contractors shall provide and maintain temporary facilities as required for the progress and completion of his contract except as otherwise noted.

F. Repair, as required, work that has been interfered with or damaged as a result of temporary facilities work.

G. The cost for repair of temporary facilities due to abuse or misuse of said facilities by other Contractors will be the financial responsibility of the responsible Contractor that abused or misused that temporary facility.

H. Provide every protection to temporary facilities as required.

NOTE: Temporary services will not commence until that Contractor responsible for such temporary services start their field work and place the temporary services into operation.

I. Temporary facilities are to be maintained and kept in good operating condition. Maintenance personnel necessary to perform this Work shall be provided. Maintenance work and repair shall be done in a timely manner causing minimal interference to other trades.

J. Temporary services shall be placed into operations by Contractor in an expedient manner as required by job conditions.

K. Additional costs for providing temporary services beyond the time period provided, shall be at the expense of that contractor requiring that extended service time period.

L. Provide and maintain temporary facilities in compliance with governing rules, regulations, codes, ordinances, and laws of agencies and utility companies having jurisdiction over work involved in project.

M. Each Contractor is responsible for temporary work provided, and shall obtain necessary permits and inspections for such work.

N. Do not interfere with normal use of roads in vicinity of project site except as authorized by the City of Orlando, Florida, Traffic Division and all other authorities having jurisdiction.

1. Permits that need to be obtained for streets that need to be partially closed or closed due to demolition operations shall be paid for and obtained by the Contractor.

O. Each Contractor shall provide at his own expense, normal weather protection as required to carry on his work expeditiously during inclement weather and to protect his work and materials from damage by the weather unless stated otherwise herein.

1.3 CONSTRUCTION PLANT

A. The Contractor and each subcontractor is to provide all items such as cranes, hoists, and other lifting devices; scaffolding, staging, platforms, runways, and ladders; temporary flooring as required for the proper execution of his Work.

1. Scaffolding and ladders must meet OSHA requirements.
2. No aluminum ladders are permitted.

B. Provide such equipment with proper guys, bracing, guards, railing, and other safety devices as required by governing authority and safety standards.

C. The Contractor shall provide, maintain and remove suitable means of travel between floor levels of building, including exterior grade levels and to all roof levels for his use until permanent stair systems are installed.

1.4 TEMPORARY UTILITIES

A. General

1. Codes and Standards

a. National Electric Code (ANSI C1).
b. National Electric Safety Code.
c. National Fire Protection Association Pamphlet.
d. Federal and State Requirements.
e. Utility Company Regulations.
f. OSHA

B. The Contractor and subcontractors shall provide at his own expense, weather protection as required to carry on his work expeditiously during inclement weather and to protect his work and materials from damage by the weather unless stated otherwise herein.

C. Description of Temporary Systems

1. Temporary Electricity – Electrical Subcontractor or Contractor

a. The Electrical Subcontractor shall to provide temporary electric service as detailed below.
b. The Electrical Subcontractor shall comply with NEC and OSHA.
c. Each subcontractor shall provide their own grounded, UL listed extension cords and other accessories to point of operation.
d. The Contractor and subcontractors who require primary power, secondary power centers, or service connections in excess of the specified minimum shall make arrangements with the Electrical Subcontractor\ and pay costs thereof.
e. Refer to additional requirements specified in this Section.

2. Temporary Lighting – Electrical Subcontractor or Contractor

a. Safety Lighting: Provide safety lighting in all construction areas and temporary walkways at all times.
b. Lamps shall be covered with safety guard or deeply recessed in reflector. Do not suspend by their electrical cords unless cord and fixture are designed for that purpose.
c. Circuits for power are to be separate from circuits used for lighting.
d. Refer to additional requirements specified in this Section.

3. Temporary Water – Contractor

a. For construction purposes:

- Contractor shall supply adequate water hoses from hose bibbs to point of his operations.
- Provide protection against freezing of the temporary water system.
- The temporary water service shall be removed when directed by the Architect.

b. Maintain adequate volume of water for required purposes.
c. The Contractor and subcontractors are to provide drinking water and ice for his own forces.
d. The Plumbing Subcontractor or Contractor shall provide the temporary water line from the meter to the building work areas.

4. Temporary Toilets – Contractor

a. The Contractor shall provide and maintain temporary toilet facilities, including toilet paper for the use of all workmen and authorized parties throughout construction period.
b. Provide the following minimum number of approved enclosed combination toilet and urinal units for construction personnel:

- For less than 20 employees: 1
- For 20 or more employees: 2 per 40 workers.
- Computation of men and women present included men and women of all contractors.

c. Location

- Within the project site where directed by the Architect and Contractor.
- Secluded from public observation.

d. Moving of portable chemical toilets for installation, cleaning, and removal shall be done during normal working hours.

5. Temporary Fire Protection – The Contractor and each subcontractor.

a. Each contractor shall provide, maintain, and perform protection and prevention of fire or fire hazards during the construction period for the protection of construction materials and personnel in accordance with Owner's Underwriter's recommendation, laws, and regulations. This includes but is not limited to, fire extinguishers, special signs, and removal of combustible materials.

D. Cost of Installation, Operation and Maintenance

1. The Contractor and the appropriate subcontractor shall provide and maintain specified temporary utilities until date of Substantial Completion unless otherwise indicated. Pay costs of installation, operation and maintenance of temporary utilities until Date of Substantial Completion.

a. Temporary Lighting: Electrical Subcontractor or Contractor.
b. Temporary Toilets: Contractor.
c. Temporary Fire Protection: All contractors.

E. Cost of Utility Consumption

1. Designated Contractor responsible for costs of consumables for temporary utilities unless otherwise indicated:

a. Temporary Electricity - Electrical Energy during construction: By Contractor or electrical subcontractor.
b. Temporary Water - Water: By Contractor or plumbing subcontractor.
c. Temporary Telephone: Telephone (by each contractor).

F. Monitor Temporary Utilities

1. Parties designated to provide a temporary utility shall be responsible for damage to his Work or to that of other contractors caused by a defect in such utility.

a. Enforce compliance with applicable codes and standards.
b. Enforce safe practices.
c. Prevent abuse of services and utilities.

d. Prevent damage to finishes.

2. Do not allow wasteful use of consumables.

G. Use of Permanent Systems for Construction Purposes

1. Obtain prior written authorization for use of systems from the Architect. Indicate the following:

a. Conditions and reasons for use.
b. Provisions relating to equipment warranties.

2. Modify and extend system as necessary to meet temporary utility requirements.
3. Upon completion of Work, or when required by the Architect, restore permanent system to specified condition prior to Substantial Completion.

a. Replace burned out or defective lamps (Contractor or electrical subcontractor).
b. Repair or restore damaged parts or components.

4. Refer to additional requirements specified in this Section.

H. Materials

1. General

a. May be new or used, but must be adequate for purpose intended. Must not create unsafe or unsanitary conditions, nor violate requirements of applicable codes. Comply with applicable Federal and State regulations.
b. Must be removed when Project is completed.

2. Temporary Lighting (Contractor or electrical subcontractor)

a. Comply with Division 16 and as specified above.
b. Receptacles, fixtures:

- Standard products, meeting UL requirements.
- Provide heavy duty guards on fixtures.
- Provide appropriate types of fixtures and receptacles for environment in which used, in accordance with NNEC, NEMA, and OSHA standards.

c. Refer to additional requirements specified in this Section.

3. Temporary Toilets (by Contractor)

a. Comply with Division 15.
b. Equipment: Standard products, meeting code requirements. Toilet Facilities: Self ventilated portable chemical toilets.
c. Toilet Tissue: Provide at each toilet, on suitable dispenser, with adequate reserve supply. Monitor daily.

I. Installation

1. General

a. Comply with applicable section of Divisions 15 and 16 and Federal and State regulations.
b. Install work in neat and orderly manner.
c. Make structurally, mechanically, and electrically sound throughout.
d. Maintain to give safe, continuous service, and to provide safe working conditions.
e. Modify and extend systems as work progress requires.

2. Temporary Lighting

a. Control lighting at secondary power centers unless otherwise specified.
b. Install exterior security lighting.

- Illuminate project site as specified.

c. Refer to additional requirements specified in this Section.

3. Temporary Telephone

a. Service and distribution wiring may be overhead or under ground.

4. Temporary Toilets

a. Erect securely
b. Service as often as necessary to prevent accumulation of wastes and creation of unsanitary conditions.

1.5 SPECIAL PRECAUTIONS AND REQUIREMENTS

A. Do not block required exits.

B. Conform to all Owner's and Architect’s rules and regulations.

C. Do not interfere with normal use of existing active utility services, except as absolutely necessary to execute required work involving such services, and then only after proper arrangements have been made through the proper authority.

D. Each contractor is responsible in the performance of his work for protection of existing active utility services.

1. Notification of proposed interruption of service must be made 2 days in advance with the Owner.

1.6 SAFETY AND PROTECTION

A. General

1. The Contractor and each subcontractor must erect and maintain, as required by existing conditions and progress of the Work, every reasonable safeguard for safety and protection, including, but not limited to, posting danger signs and other warnings against hazards, promulgating safety regulations, and notifying owners and users of adjacent utilities.
2. The Contractor and each subcontractor must provide protection at all times against damage with vandalism, theft, weather, and other causes to completed Work, materials, and apparatus.
3. The Contractor and each subcontractor shall take every appropriate precaution to prevent damage to his work and workers of other contractors. Damage which is caused to another contractor's Work will be repaired or replaced at the damaging contractor's expense.
4. The Contractor and each subcontractor shall protect existing trees, planting, structures, road, and walks during progress to the Work.
5. The Contractor and each subcontractor shall submit 3 copies of Contractor(s)' Safety Program and designate a responsible employee at the site whose duty shall be the prevention of accidents. The person shall be the Contractor's Superintendent unless otherwise designated by the contractor in writing to the Architect.
6. No contractor shall load or permit any part of the Work to be loaded so as to endanger its safety.
7. The Contractor shall have a full-time, dedicated and qualified Safety Person for the Project to inspect job for safety hazards of all trades. This person will hold and record safety meetings once a week at the Superintendent Meeting. The Safety Person shall point out immediately to each Contractor each safety hazard he finds. Each Contractor shall correct the safety problem immediately.

    a. If safety problems are not corrected by appropriate trade, then the Safety Person shall take corrective action and charge the appropriate parties.
    b. This Safety Person shall record all accidents for the Project.

8. The Contractor and each subcontractor shall provide safety protection at each area which, because of his operation, creates a safety hazard.
9. The Contractor shall take every appropriate safety precaution to prevent damage to the work or injury to the workers of other contractors. This includes, but not limited to, overhead protection.
10. In an emergency affecting the safety of life, the work or adjoining property, the contractor, without special instruction or authorization from the Architect, or Owner, shall take the action necessary to prevent such threatened loss of injury.
11. The Contractor and each subcontractor shall provide at the site first aid supplies for minor injuries. All injuries must be reported immediately to the job office, and the Superintendent of the Contractor shall make a written report thereof. A copy of same shall be sent to the Architect.
12. Owner reserves the right to personally inspect and or employ a third party inspector to make periodic inspection of the site to determine extent of compliance to safety conditions. Any observed safety conditions would be forwarded immediately in written format to the Safety Representative of the Contractor for corrective action.

B. Water Control

1. The Contractor shall be responsible for erosion control, dewatering, pumping, and removal of all water until mass excavation has been completed unless otherwise noted.

C. Safety Devices

1. The Contractor shall provide fences, barricades, bridges, railings, and guards for protection of construction personnel and the public, and to provide protection of his Work installed.
2. The Contractor shall provide additional protection as may be required if additional protection is needed at a different time.

D. Streets and Sidewalks

1. The Contractor shall be responsible to keep public streets adjacent to project site free of mud, debris, and other foreign materials resulting from all project construction and vehicular traffic leaving site, to the satisfaction of governing public authorities regulating such conditions and Architect.

2. Do not interfere with normal use of streets in vicinity of project site except as indicated or as absolutely necessary to execute required work, and then only after proper arrangements have been made with authorities having jurisdiction including traffic control as applicable.

E. Hazardous Materials

1. When the use of storage of hazardous materials or equipment is necessary for the execution of the Work, the contractor shall exercise the utmost care and shall carry on such activities under the supervision of properly qualified personnel. Such use and storage shall also be in accordance with governing authority. The use of explosives shall not be permitted.

F. Protect existing property from damage during the work required by these Contract Documents. Any damage done to existing property shall be repaired satisfactorily to the approval of the Superintendent and/or Owner.

G. Existing property includes, but shall not be limited to, buildings, sidewalks, curbs, lawns, grass, trees and shrubs.

H. In the event of temporary suspension of work for inclement weather or for any other reasons, the Contractor shall protect all work and materials against damage or injury. If damage or injury results from failure to protect, such work and materials shall be removed and replaced at no additional cost to the Owner.

I. All existing water and gas pipe, sewers, drains, electrical ducts, telecom duct, and other duly authorized structures shall be properly supported and protected by and at the expense of the Contractor during the construction of work under or near them and so as not to interfere with their use. They shall be left in as good condition on completion of the work as when found by the Contractor.

1.7 TEMPORARY FIRST AID FACILITIES

A. The Contractor and all subcontractors shall provide first aid facilities as required by Federal, State, or Local Safety Regulations.

1.8 TEMPORARY STORAGE

A. The Contractor and each subcontractor shall provide suitable storage facilities for materials delivered to site and protect materials from weather and damage.

1. Temporary storage of materials at site shall not interfere with the Work of other contractors or the Work and property of the Owner. If necessary or as directed by the Architect, stored materials shall be relocated or removed.
2. Location on site for storage facilities shall be in designated areas as approved by the Architect and Owner.

1.9 SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION

A. These Construction Documents and the construction hereby contemplated shall be governed by applicable provisions of Federal, State, and local regulations for construction safety in the State in which the project is located.

3. The Contractor and each subcontractor shall be responsible for the safety and health of persons and property affected by the contractor's performance of the Work including work performed by subcontractors. This requirement shall apply continuously during the entire contact period and shall not be limited to normal working hours.
4. The Contractor and each subcontractor shall designate a qualified safety and health representative to be responsible for the administration of the Contractor's Safety and Health program.

B. Each contractor shall be responsible for compliance with the above aforesaid safety and health regulations for construction as applicable to the Contractor's Contract and the Contractor's construction means and methods. The Contractor shall be liable for violations as may be cited or charged against the subcontractor by authorities governing the safety and health regulations for construction.

1. Each subcontractor shall comply with the Contractor's Safety Program.

1.10 UTILITY PROTECTION

A. Existing utility lines and structures indicated or known, and utility lines constructed for this Project shall be protected from damage during demolition and construction operations.

B. Locate and flag lines and structures before beginning demolition and other related operations.

C. When utility lines and structures that are to be removed or relocated are encountered within the area of operations, notify the Architect and affected utility in ample time for the necessary measures to be taken to prevent interruption of the services.

D. Damage to existing utility lines or structures not indicated or known shall be reported immediately to the Superintendent and the affected utility.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01 50 00

SECTION 01 56 00
TEMPORARY PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

A. This section specified requirements for protection.

B. Protection facilities required include but are not limited to:

1. Barricades, warning signs, lights.
2. Temporary protection of public sidewalks.

1.2 QUALITY ASSISTANCE

A. Regulations: Comply with industry standards and applicable laws and regulations if authorities having jurisdiction, including but not limited to:

1. Building Code requirements.
2. Health and safety regulations.
3. Utility company regulations.
4. Police, Fire Department and Rescue Squad rules.
5. Environmental protection regulations.

B. Standards: Comply with NFPA Code 241, "Building Construction and Demolition Operations", ANSI-A10 Series standards for "Safety Requirements for Construction and Demolition", and NECA Electrical Design Library "Temporary Electrical Facilities."

1. Refer to "Guidelines for Bid Conditions for Temporary Job Utilities and Services", prepared jointly by AGC and ASC, for industry recommendations.
2. Electrical Service: Comply with NEMA, NECA and UL standards and regulations for temporary electric service. Install service in compliance with National Electric Code (NFPA 70).

C. Inspections: Arrange for authorities having jurisdiction to inspect each disconnected utility. Obtain required certifications and permits.

PART 2 -PRODUCTS

2.1 EQUIPMENT

A. First Aid Supplies: Comply with governing regulations.

B. Fire Extinguishers: Provide hand-carried, portable UL-rated, class "A" fire extinguishers for temporary offices and similar spaces. In other locations provide hand-carried, portable, UL-rated, class "ABC" dry chemical extinguishers, or a combination of extinguishers for NFPA recommended classes for the exposure.

1. Comply with NFPA 10 and 241 for classification, extinguishing agent and size required by location and class of fire exposure.

PART 3 - EXECUTION

3.1 PROTECTION FACILITIES INSTALLATION

A. Temporary Fire Protection: Comply with NFPA 10 "Standard for Portable Fire Extinguishers," and NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations."

1. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher on each floor at or near each usable stairwell.
2. Store combustible materials in containers in fire-safe locations.
3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways and other access routes for fighting fires. Prohibit smoking in hazardous fire exposure areas.

B. 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.

C. 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 which produce harmful noise. Restrict use of noise making tools and equipment to hours that will minimize complaints from persons or firms near the site.

END OF SECTION 01 56 00

SECTION 01 60 00
PRODUCTS, MATERIALS, AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. It is the intent of the Specifications and Drawings to accomplish a complete and first-grade installation in which there shall be installed new materials and products of the latest and best design and manufacturer. Workmanship shall be thoroughly first-class and complete, executed by competent and experienced workmen.

B. Equipment, specialties, and similar items shall be checked for compliance and fully approved prior to installation. contractors are cautioned that work or equipment installed without approval is subject to condemnation, removal, and subsequent replacement with an approved item without extra compensation.

1.2 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," "structures," "finishes," "accessories," and similar terms. Such terms and definitions are self-explanatory and have well recognized meanings in the construction industry.

1. "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 manufacturer's product name, including make or model designation, indicated in the manufacturers published product literature that is current at of the date of the Contract Documents.
    b. "Foreign Products", as distinguished from "domestic products," are items substantially manufactured (50 percent or more of value) outside of the United States and its possessions; or produced or supplied by entities substantially owned (more than 50 percent) by persons who are not citizens or nor living within the United States and its possessions.

2. "Materials" are products that are substantially shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.
3. "Equipment" is a product with operational parts, whether motorized or manually operated, that requires service connections such as wiring or piping.

PART 2 - PRODUCTS

2.1 PRODUCT STANDARD AND QUALITY - SUBSTITUTIONS

A. The Contract is based on the materials, equipment, and methods described in the Contract Documents.

1. All product manufacturers for panel walls, exterior doors, roofing products, skylights, windows, shutters, structural components and products comprising a building's envelope introduced as a result of new technology, whether or not listed or specified, shall comply with Rule 9B-72 of the Florida Administrative Code and shall comply with the 2007 Florida Building Code with the 2009 Supplement.
2. If certain manufacturers listed are not approved, the product manufacturer shall be responsible to obtain approvals in accordance with Rule 9B-72 of the Florida Administrative Code prior to submitting product data or shop drawings for this project. Otherwise, if not approved by the State, the manufacturer will not be acceptable for use on this project.

B. Where in the Drawings and Specifications certain products, manufacturer's tradenames, or catalog numbers are given, it is done for the expressed purpose of establishing a basis of design, quality, durability, and efficiency of design in harmony with the work outlined and is not intended for the purpose of limiting competition.

C. The Architect will consider proposals for substitutions of materials, equipment, and methods only when such proposals are accompanied by full and complete technical data and all other information required by the Architect to evaluate the proposed substitution.

D. Do not substitute materials, equipment, or methods unless such substitution has been specifically approved for this Work by the Architect.

E. "Or equal":

1. Where the phrase "or equal" or "or equal as approved by the Architect" occurs in the Contract Documents, do not assume that material, equipment, or methods will be approved as equal by the Architect unless the item has been specifically approved for this Work by the Architect.
2. The decision of the Architect shall be final.

F. Availability of Specified Items:

1. Verify prior to bidding that specified items will be available in time for installation during orderly and timely progress of the Work.
2. In the event specified item or items will not be so available, so notify the Architect prior to receipt of bids.
3. Costs of delays because of non-availability of specified items, when such delays could have been avoided by the contractor, will be back charged as necessary and shall not be borne by the Owner.

G. Where the questions of appearance, artistic effect, or harmony of design are concerned, the Architect reserves the right to refuse approval of substituted products proposed to be substituted for that specified, if in his opinion the item to be substituted is not harmonious to the finished effect and appearance desired, as portrayed in the Drawings and Specifications. The Architect's said refusal to approve, established by this paragraph, is final and not subject to arbitration.

H. Products of other manufacturers will be considered for acceptance provided they equal or exceed the material requirements and functional qualities of the specified product. Requests for Architect's approval and complete technical data for evaluation must be received at least 10 days prior to bid due date. Additional approved manufacturers will be issued by Addendum.

2.2 MANUFACTURER'S DIRECTIONS

A. Manufactured products shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with the manufacturer' printed directions, unless herein specified to the contrary. Where manufacturer's printed directions are available and where reference is made to manufacturer's directions in the Specification, the contractor shall submit 2 copies of such directions to the Architect prior to the beginning of Work covered thereby.

B. Where specific installation instructions are not part of these Specifications and Drawings, equipment shall be installed in strict accordance with instructions from the respective manufacturers. Where installation instructions included in these Specifications or Drawings are at a variance with instructions furnished by the equipment manufacturer, the contractor shall make written request for clarification from the Architect.

C. In accepting or assenting to the use of apparatus or material, or make, or arrangement thereof, the Architect in no way waives the requirements of these specifications or the warranty embodied therein.

2.3 WARRANTIES

A. Specific warranties or bonds called for in the Contract Documents, in addition to that falling under the general warranty as set forth in General Conditions, shall be furnished in accordance with the requirements of the Specifications.

B. Each contractor shall and does hereby agree to warrant for a period of one year, or for longer periods, where so provided in the Specifications, as evidenced by the date of Substantial Completion issued by the Architect, products installed under the Contract to be of good quality in every respect and to remain so for periods described herein.

C. Should defects develop in the aforesaid Work within the specified periods, due to faults in products or their workmanship, the contractor hereby agrees to make repairs and do necessary Work to correct defective Work to the Architect's satisfaction, in accordance with the Supplementary Conditions. Such repairs and corrective Work, including costs of making good other Work damaged by or otherwise affected by making repairs or corrective Work, shall be done without cost to the Owner and at the entire cost and expense of the contractor within 14 days after written notice to the contractor by the Owner.

D. Nothing herein intends or implies that the warranty shall apply to Work which has been abused or neglected or improperly maintained by the Owner or his successor in interest.

E. Where service on products is required under this Article, it shall be promptly provided when notified by the Owner and no additional charge shall be made, unless it can be established that the defect or malfunctioning was caused by abuse or accidental damage not to be expected under conditions of ordinary wear and tear.

F. In the event movement in the adjoining structure or components causes malfunctioning, the contractor responsible for the original installation of the adjoining structure or components shall provide such repair, replacement, or correction necessary to provide for proper functioning to bring the equipment back into the same operating condition as approved at the completion of the building.

G. The manufacturer and supplier expressly warrants that each item of equipment furnished by him and installed in this Project is suitable for the application shown and specified in the Contract documents and includes features, accessories, and performing characteristics listed in the manufacturer's catalog in force on the date bids are requested for the Work. This warranty is intended as an assurance by the manufacturer that his equipment is not being misapplied and is fit and sufficient for the service intended. This warranty is in addition to and not in limitation of other warranties or remedies required by law or by the Contract Documents. It shall be the responsibility of the contractor for the particular equipment to obtain this warranty in writing.

H. In case the contractor fails to do Work so ordered, the Owner may have work done and charge the cost thereof against monies retained as provided for in the Agreement and, is said retained monies is available, the contractor and his Sureties shall agree to pay to the Owner the cost of such Work.

2.4 MATERIAL DELIVERY AND RESPONSIBILITIES

A. Each contractor shall be responsible for materials he orders for delivery to the jobsite. Responsibility includes, but is not limited to, receiving, unloading, storing, protecting, and setting in place; ready for final connections. Each contractor will coordinate jobsite storage with the Design-Builder.

1. The Owner will not be responsible for deliveries related to the construction or operation of the contractor. The Owner cannot sign delivery forms for the contractor.

B. Contractors shall insure that products are delivered to the Project in accordance with the Construction Schedule of the Project. In determining date of delivery, sufficient time shall be allowed for shop drawings and sample approvals, including the possibility of having to resubmit improperly prepared submittals or products other than those specified and the necessary fabrication or procurement time along with the delivery method and distance involved.

2.5 PROTECTION

A. Each contractor shall protect building elements and products when subject to damage. Should workmen or other persons employed or commissioned by one contractor be responsible for damage, the entire cost of repairing said damage shall be assumed by said individual contractor. Should damage be done by a person or persons not employed or commissioned by a contractor, the respective contractors shall make repairs and charge the cost to the guilty person or persons. The affected contractors shall be responsible for collecting such charges. If the person or persons responsible for damage cannot be discovered, full and satisfactory repairs shall be made by the respective contractor, and the cost of Work shall be prorated against each contractor.

B. The respective contractors shall protect their products prior to installation and final acceptance. Storage shall be dry, clean, and safe. Materials or equipment damaged, deteriorated, rusted or defaced due to improper storage, shall be repaired, refinished, or replaced, as required by the Architect. Products lost through theft or mishandling shall be replaced by the contractor without cost to the Owner.

2.6 ACCEPTANCE OF EQUIPMENT OR SYSTEMS

A. The Owner will not accept the start of the warranty period on systems or equipment until Substantial Completion is issued to the respective contractor(s) for Owner's occupancy of the building, in part or whole. Each contractor shall make such provisions as required to extend the manufacturer's warranty from time of initial operation of systems or equipment until Substantial Completion is given in writing.

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01 60 00

SECTION 01 60 10
PRODUCT SUBSTITUTIONS

PART 1 - GENERAL

1.1 DEFINITIONS

A. Definitions used in this Article are not intended to change or modify the meaning of other terms used in the Contract Documents.

B. Substitutions: Requests for changes in products, materials, equipment, and methods of construction required by Contract Documents proposed by the Contractor after award of the Contract are considered requests for "substitutions." The following are not considered substitutions:

1. Revisions to Contract Documents requested by the Owner or Architect.
2. Specified options of products and construction methods included in Contract Documents.
3. The Contractor's determination of and compliance with governing regulations and orders issued by governing authorities.

1.2 SUBMITTALS

A. Substitution Request Submittal: Request for product substitution shall be submitted to the Architect no later than ten (10) days prior to bid due date. Requests received after this time may not be considered.

1. Substitutions after the bid date may be accepted and will be reviewed on a case-by-case basis.

B. Contractor's Substitution Request Form: Submit substitution requests to the Architect (through Design-Builder) on the "Contractor Substitution Request Form" attached at the end of this Section.

C. Substitutions shall include product data, samples and shop drawings as required to evaluate the proposed product. Submittals shall also include specified product (some additional engineering may be required with specific materials) with a line-by-line comparison of the products.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Conditions: The Contractor's substitution request will be received and considered by the Owner when one or more of the following conditions are satisfied, as determined by the Owner; otherwise requests will be returned without action except to record noncompliance with these requirements.

1. Extensive revisions to Contract Documents are not required.
2. Proposed changes are in keeping with the general intent of Contract Documents.

3. The request is timely, fully documented and properly submitted.
4. The request is directly related to an "or equal" clause or similar language in the Contract Documents.
5. The specified product or method of construction cannot be provided within the Contract Time. The request will not be considered if the product or method cannot be provided as a result of failure to pursue the Work promptly or coordinate activities properly.
6. The specified product or method of construction cannot receive necessary approval by a governing authority, and the requested substitution can be approved.
7. A substantial advantage is offered the Owner, in terms of cost, time, energy conservation or other considerations of merit, after deducting offsetting responsibilities the Owner may be required to bear. Additional responsibilities for the Owner may include additional compensation to the Architect for redesign and evaluation services, increased cost of other construction by the Owner or separate Contractors, and similar considerations.
8. The specified product or method of construction cannot be provided in a manner that is compatible with other materials, and where the Contractor certifies that the substitution will overcome the incompatibility.
9. The specified product or method of construction cannot be coordinated with other materials, and where the Contractor certifies that the proposed substitution can be coordinated.
10. The specified product or method of construction cannot provide a warranty required by the Contract Documents and where the Contractor certifies that the proposed substitution provide the required warranty.

C. The Contractor's submittal and the Architect's acceptance of Shop Drawings, Product Data or Samples that relate to construction activities not complying with the Contract Documents does not constitute an acceptable or valid request for substitution, nor does it constitute approval.

PART 3 - EXECUTION (NOT USED)

CONTRACTOR'S REQUEST FOR SUBSTITUTION

PROJECT:_____ DATE:_____

SPECIFICATION SECTION:_____ ITEM(S):_____

SPECIFIED MANUFACTURER:_____

SPECIFIED MODEL NO:_____

PROPOSED MANUFACTURER:_____

PROPOSED MODEL NO:_____

REASON/S FOR _____

REQUEST FOR _____

SUBSTITUTION _____

Attach complete technical data, including laboratory tests, if applicable, in duplicate.

A. Will approval affect dimensions shown on Drawings in any way? No_____ Yes_____
Explain (Attach drawings if necessary):_____

B. Will the Contractor pay for any changes to the building design, including engineering and detailing costs caused by the approval? No_____ Yes_____
Explain:_____

C. Will approval affect the work of other trades? No_____ Yes_____
Explain:_____

D. Manufacturer's guarantees of the proposed and specified items are: Same_____ Different_____
Explain:_____

E. Does the proposed item meet all applicable Codes, Ordinances and regulations for this specific application? No_____ Yes_____
Explain:_____

F. Has proposed item been used locally in similar applications? No_____ Yes_____
Explain:_____

G. If approved, will the Owner receive a credit for the proposed alternate material? No____ Yes____
Explain:_____

H. Does the proposed alternate material meet the same applicable standards (ASTM, ANSI, UL, FS.) as the specified item? No_____ Yes_____
Explain:_____

It is the Contractor's responsibility to provide all information necessary to determine the proposed alternate material is equal or better than the specified item. This includes any test reports, product data, manufacturer's specifications, color samples, product samples or the like as may be required for an evaluation.

The Architect and Owner will not be required to prove any product is not equal or suitable to the Project.

SUBMITTED BY:_____

Firm:_____
Address:_____

Signature:_____ Date:_____

FOR ARCHITECT'S USE:

Not Acceptable _____

No Exceptions Taken _____

By:_____ Date:_____

END OF SECTION 01 60 10

SECTION 01 70 00
PROJECT CLOSEOUT

PART 1 - GENERAL

1.1 SUMMARY

A. Closeout is hereby defined to include general requirements near the end of Contract Time in preparation for final acceptance, final payment, normal termination of contract, occupancy by Owner, and similar actions evidencing completion of the work. Specific requirements for individual parts of the Work are specified in Sections of Divisions 2 through 33. Time of closeout is directly associated to Date of Substantial Completion.

1.2 PREREQUISITES TO SUBSTANTIAL COMPLETION

A. Prior to requesting Architect review for Certificate of Substantial Completion, (for either entire Work or portions thereof), complete the following and list known exceptions in request.

1. Advise Owner of pending insurance changeover requirements.
2. Submit specific warranties, workmanship/maintenance bonds, maintenance agreements, agreements, final certifications, and other required closeout documents.
3. Obtain and submit release enabling Owner's full and unrestricted use of the Work and access to services and utilities, including occupancy permits, operating certificates, and other similar required releases.
4. Deliver tools, spare parts, extra stocks of materials, and similar physical items as specified to the Owner. Obtain receipts for deliveries.
5. Make final changeover of locks and transmit keys to Owner and advise Owner's personnel of changeover in security provisions.
6. Complete start-up testing of systems and instruction of Owner's operating/maintenance personnel. Discontinue and remove from project site temporary facilities and service, construction tools and facilities, mock-ups, and other construction elements.
7. Complete final cleaning up requirements as specified in Section 01 74 13.

1.3 PREREQUISITES TO FINAL PAYMENTS

A. Prior to requesting Architect final review for certification of final payment, complete the following:

1. Refer to the Supplementary Conditions.
2. Submit final payment request with required closeout attachments.
3. Submit copy of Architect's final punch list of itemized Work to be completed or corrected, stating that each and every item has been completed or otherwise resolved for acceptance.
4. Submit record drawings, maintenance manuals, and similar final record information as specified.
5. Submit certification of code compliance.

6. Submit certification stating that no materials containing asbestos were incorporated into the Work.
7. Plumbing Contractor shall submit certification stating that no flux or solder used for drinking water piping containing more than 0.2 percent lead, and that no pipe or fittings used for drinking water piping contained no more than 0.8 percent lead.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 PUNCH LIST

A. Prior to the Architect's preparation of a Project Punch List, Contractor shall prepare his own punch list and submit to the Architect through the Contractor.

B. The Contractor's inspection shall be as thorough as possible, in accordance with his aspiration to provide first-class workmanship and maintain good reputation and shall include Work under his Contract, including that of his subcontractors.

C. The Architect shall observe the Work, providing that the Work on the Contractor's punch list has been completed, and prepare the Project Punch List for use.

D. The Architect will only perform two (2) punch list inspections. The Architect will do the first inspection prior to issuing the Substantial Completion certificate and will do a second inspection within 30 days of the first inspection to verify that the contractor has completed the outstanding items on the first inspection punch list. Additional inspections above and beyond as specified herein are at additional cost to the Contractor.

3.2 WARRANTY - CORRECTION OF THE WORK

A. At approximately one month prior to the one year warranty expiration, the Owner, Architect, and a representative of the Contractor shall visit the site and prepare the warranty punch-list.

A. This Work shall be completed immediately by the Contractor(s) after receiving notification.

3.3 PROJECT RECORD DRAWINGS

A. Contractor shall keep current during the progress of the Work, and submit updated Project Record Drawings at the completion of the project, especially for the purpose on this project. Drawings shall incorporate changes made in the Work of the respective trades during the construction period. Such changes shall be indicated at the time they occur for accuracy.

B. Maintain at the job site one copy of Drawings, Project Manual, Addenda, approved shop drawings, change orders, field orders, other Contract modifications, and other approved documents submitted by the Contractor(s), in compliance with various Sections of the Project Manual.

C. Each of these Project Record Documents shall be clearly marked "Project Record Copy"; maintained in good condition; available for observation by the Architect; and shall not be used for construction purposes. Mark up the documents to indicate the following:

1. Significant changes and selections made during the construction process;
2. Significant detail not shown in the original Contract Documents including change orders;
3. The location of underground utilities and appurtenances dimensionally referenced to permanent surface improvements;
4. The location of internal utilities and appurtenances concealed in building structures, referenced to visible and accessible features of the structure;
5. When elements are placed exactly as shown on the Drawings, so indicate; otherwise, indicate changed location.

D. Keep Project Record Documents current. Do not permanently conceal Work until the required information has been recorded.

E. Prior to final payment on the Project, submit to the Architect the Project Record Drawings for changes recorded for the Work of Divisions 2 through 14.

F. Prior to final complete and payment, the Contractors for Mechanical Work and Electrical Work, Divisions 21 through 28, shall update their working drawings with changes made in his Work. Submit one complete set of transparencies and 2 complete sets of prints of these changed working drawings to the Architect.

1. Each drawing shall be labeled "Project Record Drawing", dated and signed by the Contractor.

G. The Contractor shall certify that the Project Record Drawings show complete and accurate as-built conditions, including without limitation, sizes, kinds of materials, vital piping and valves, conduit locations, and other similar and required items.

H. Contractor(s) shall include as part of the Project Record Drawings, a complete and current Project Manual, indicating changes made relating to the specifications. All requirements for the Project Record Drawings apply to the Project Record Project Manual.

I. The Contractor shall maintain all approved Permit Drawings in a manner so as to make them accessible to governmental inspectors and other authorized agencies. All approved Drawings shall be wrapped, marked, and delivered to the Owner within 10 days of the Date of Substantial Completion of the Work.

J. Project Record Documents are all to be electronic in pdf format.

3.4 CERTIFICATION OF CODE COMPLIANCE

A. Prior to final payment, the contractor indicated below shall submit to the Architect (in duplicate), letters of certification of code compliance as follows:

1. The Subcontractor(s) for Division 22, 23, 24, Mechanical Work, shall submit a letter certifying that mechanical installations comply with current applicable Codes.
2. The Subcontractor(s) for Division 26, 27, 28 Electrical Work, shall submit letters certifying that electrical wiring complies with NEC current applicable editions.
3. The Subcontractor for Division 26, 27, 28, Electrical Work, shall submit letters certifying that alarm systems and smoke and heat detection systems comply with State of Indiana Codes and Regulations, current applicable conditions.

3.5 MAINTENANCE AND OPERATING MANUALS

A. Prior to Date of Substantial Completion, and a requirement prior to receiving final payment, Contractor shall submit to the Architect three (3) copies of a comprehensive Maintenance and Operating Manual presenting complete directions and recommendations for the proper care and maintenance of visible surfaces as well as maintenance and operating instructions for equipment items which he has provided. Operation and Maintenance Manuals shall include the following:

1. Schematic and piping and wiring diagrams.
2. Valve charts and schedules.
3. Lubrication charts and schedules.
4. Guides for troubleshooting.
5. Pertinent diagrams of equipment with main parts identification.
6. Manufacturer's data on all equipment.
7. Operating and maintenance instructions for all equipment.
8. Manufacturer's parts list.
9. Any testing procedures for operating tests.

B. Operating instructions shall include necessary printed directions for correct operations, adjustments, servicing, and maintenance of movable parts. Also included shall be suitable parts lists, approved shop drawings, and diagrams showing parts location and assembly.

C. Upon Architect's approval and prior to issuance of final payment(s), Contractor shall submit three (3) corrected and completed copies of Operating and Maintenance Manuals to the Architect.

D. Finished manuals shall be loose-leaf type with hardboard covers and titled tabs identifying each particular portion or item of the Work.

E. For each titled item or portion of the Work, manual must provide the names, addresses, and phone numbers of the following parties:

1. Contractor/installer
2. Manufacturer
3. Nearest dealer/supplier

4. Nearest agency capable of supplying parts and service

F. For each manual label on front cover or spine, indicate the following information:

1. Project name and address
2. Owner's name
3. Name and address of Architect
4. Name and address of all contractors and their contacts
5. Date of submission

G. The contractor(s) shall instruct the Owner's operating personnel in the proper use, care and emergency repair of all equipment installed before final payment. The contractor(s) shall call particular attention to any safety measures that should be followed. The instruction shall be adequate to train the Owner's operating personnel in the proper use, care, and emergency repair of such equipment.

H. Refer to Section 01 33 00 for additional requirements.

3.6 CHARTS AND LOCATIONS OF CONCEALED WORK

A. The contractor(s) for Mechanical Work shall prepare suitable charts identifying and locating each concealed control or other concealed item requiring repair, adjustment, and maintenance. Charts shall be mounted in suitable frames with glass covers secured to wall where directed.

B. Charts shall list each item, together with its function, item number and location.

C. Locations throughout the building shall be identified on the wall or ceiling by permanent, non-obstructive plates, labels, or other approved means secured in a permanent manner.

D. Chart details, identification methods, locations, and methods of attachment shall be specified or approved by the Architect at the jobsite upon full submission of proposed procedures and proper execution of same.

END OF SECTION 01 70 00

SECTION 01 74 13
CONSTRUCTION CLEANING

PART 1 - GENERAL

1.1 SUMMARY

A. The Architect reserves the right to act on behalf of the Owner pertaining to the clean-up responsibilities that are a part of each Contractor's Work.

1.2 PURPOSE - DAILY CLEANING

A. Define and emphasize the responsibility of each Contractor to remove his rubbish and debris from the construction site to guard against fire and safety hazards as well as to provide a more efficient construction operation for all Contractors. If this cleaning is not performed to the satisfaction of the Owner and the Architect, it will be performed for the Contractor at his expense.

1.3 PURPOSE - ROUTINE CLEANING

A. Each Friday afternoon, and more often if necessary, each Contractor shall perform an overall cleanup of the entire site, including a broom cleaning of appropriate surfaces. The trades shall remove their rubbish and debris from the building site to the rubbish collection location promptly upon its accumulation and in no event later than the regular Friday general cleanup.

1.4 RUBBISH CONTAINER

A. The Prime Contractor shall provide dumpster type rubbish container with lid, sized adequate for the Project waste, debris, and rubbish for the life of the Project.

B. Dispose of container contents weekly or at more frequent intervals if required by inadequate container capacity.

1.5 SAFETY REQUIREMENTS

A. Hazards Control (By each Contractor)

1. Store volatile wastes in covered metal containers, and remove from the premises daily.
2. Prevent accumulation of wastes, which create hazardous conditions.
3. Provide adequate ventilation during use of volatile or noxious substances.

B. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.

1. Do not burn or bury rubbish and waste materials on project site.

2. Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.
3. Do not dispose of wastes into streams or waterways.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Use only cleaning materials recommended by manufacturer of surface to be cleaned.

B. Use cleaning materials only on surface recommended by cleaning material manufacturer.

PART 3 - EXECUTION

3.1 DAILY CLEANING

A. Contractor shall execute daily cleaning to ensure that building, grounds, and public properties are maintained free from accumulations of waste materials and rubbish.

B. Wet down dry materials and rubbish to lay dust and prevent blowing dust.

C. Daily, during progress of work, clean site and public properties and dispose of waste materials, debris, and rubbish in dumpster type rubbish container provided under this Section.

D. Handle materials in a controlled manner with as few handlings as possible; do not drop or throw materials from heights.

E. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet, newly painted surfaces.

F. Place no new work on dirty surfaces.

3.2 ROUTINE CLEANING

A. Employ experienced workmen for cleaning.

B. Remove dirt, mud, and other foreign materials from sight exposed interior and exterior surfaces.

C. Each Friday, or at more frequent intervals, if work activities justify same, perform the following cleaning. This includes all dirt, dust, and debris not identifiable as part of a Contract. Broom clean floor and paved surfaces; rake clean other surfaces of ground.

D. Maintain adjacent roads free from the accumulation of mud, rocks, rubbish, litter and debris resulting from construction activities.

E. Remove litter, rubbish and debris from chases, whether the chases will be accessible or not.

F Maintain cleaning throughout the life of the Project.

G. Should the Contractor fail in the performance of this Work, the Owner may perform such Work in accordance with Article 3 of the General Conditions.

3.3 FINAL CLEANING (Contractor)

A. Contractor shall perform his respective final clean-up and shall leave the Work of the complete Project in clean, neat condition. The following are examples, but not by way of limitation, of cleaning levels required.

1. Remove labels which are not required as permanent labels.
2. Wipe surfaces of electrical equipment clean.
3. Remove debris and surface dust from limited access spaces including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
4. Clean light fixtures and lamps so as to function with full efficiency. Replace all lamps that are burnt out and/or flickering.

END OF SECTION 01 74 13

SHALLOW SUBSURFACE SOIL AND WATER TABLE EXPLORATION FOR "PALMETTO PARK AND RIDE" 19TH STREET WEST, PALMETTO, MANATEE COUNTY, FLORIDA

Ardaman & Associates, Inc.

OFFICES

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MEMBERS:
A.S.F.E.
American Concrete Institute
American Society for Testing and Materials
Florida Institute of Consulting Engineers

Ardaman & Associates, Inc.

Geotechnical, Environmental and
Materials Consultants

June 23, 2010
File No. 10-7224

TO: Schenkel Shultz Architects
4890 West Kennedy Boulevard, Suite 930
Tampa FL 33609

Attention: Drazen Ahmedic, AIA

SUBJECT: Shallow Subsurface Soil and Water Table Exploration for "Palmetto Park and Ride," 19th Street West, Palmetto, Manatee County, Florida

---

Dear Drazen:

As requested, our firm has completed explorations and analysis of the subsurface soil and water table conditions at the subject site. This report will present the results of our explorations and our recommendations.

This report was prepared for the exclusive use of Schenkel Shultz Architects and their consultants, for specific application to the subject site. Our services have been performed in accordance with generally-accepted engineering practices. No other warranty, expressed or implied, is made.

We appreciate the opportunity to be of your service. Please contact our office when we may be of further service or should you have any questions concerning this report.

Very truly yours,

ARDAMAN & ASSOCIATES, INC.
Certificate of Authorization No. 5950

6/23/10

Jerry H. Kuehn, P.E.
Senior Project Engineer
Fl. License No. 35557

Gary H. Schmidt, P.E.
Vice President
Fl. License No. 12305

JHK/GHS:nh

cc: Mr. Jeremy Fireline, P.E. – ZNS Engineering

TABLE OF CONTENTS

1.0 SCOPE

The scope of our services has included the following items:

1. Performing four (4) hand auger borings to determine the nature of the subsurface soils and existing groundwater table levels.

2. Reviewing each soil sample obtained in our field exploration program by a geotechnical engineer in the laboratory for further investigation, classification and assignment of laboratory tests.

3. Analyzing the existing subsurface soil and drainage conditions to address the following:
   a. the seasonal high groundwater table,
   b. proposed pavement base

4. Preparing this report to document the results of our field exploration program, engineering analyses and recommendations.

2.0 FIELD EXPLORATION

Our field exploration program included conducting four (4) hand auger borings. The number, location and depth of the borings were determined by Ardaman & Associates, Inc.

The test locations are shown on the attached Figure 1. The test borings were located in the field by visual reference to available site landmarks. Test boring locations should be considered accurate only to the degree implied by the method used. Should more accurate locations be required, a registered land surveyor should be retained.

The hand auger borings were performed to determine the existing groundwater table and subsurface soil conditions to a maximum depth of 6.0 feet below the existing ground surface. The methods and equipment used in the borings are described in Appendix I of this report. The soil profiles and groundwater table depths encountered at the time of this exploration are shown on the soil boring logs in **Appendix I**.

3.0 LABORATORY TESTING

Samples obtained during our field exploration program were thoroughly examined in our laboratory to obtain an accurate definition of the soil profile. Routine laboratory tests were performed to aid in soil classification and to better define engineering properties. These tests included determining the fines (silt and clay) content, water content and organic content of selected samples. The test results are shown at the respective sample depth on the soil boring logs in **Appendix I**. Based on the laboratory test results and visual classification procedures, the soils have been classified in general compliance with the Unified Soil Classification System (ASTM D-2487) by a geotechnical engineer.

4.0 HYDROLOGIC LITERATURE REVIEW

We have reviewed pertinent published literature on surficial soil and hydrologic conditions at and near the site. A discussion of this is presented below, plus a summary of groundwater table definitions.

4.1 Groundwater Table Definitions

The site vicinity is underlain by the unconfined surficial aquifer system, which consists primarily of relatively permeable, sandy sediments overlying an aquiclude that exists at some depth below the ground surface. This aquiclude hydraulically separates the surficial aquifer from the deeper artesian aquifer systems.

The groundwater table in the surficial aquifer generally occurs within a few to several feet below the ground surface. The groundwater table is defined as the surface at which the fluid pressure in the pores of the porous medium (i.e. soil) is equal to atmospheric pressure. The groundwater

table level is revealed by the level at which water stands in a shallow open hole (or well) which penetrates into the surficial deposits just deep enough to encounter standing water in the bottom.

Under natural conditions, the groundwater table aquifer is recharged primarily by rainfall and discharges primarily by evapotranspiration and by lateral seepage to surface waters (streams, ditches, etc.). Seasonal variations in rainfall and evapotranspiration cause the groundwater table to fluctuate. The seasonal high groundwater table is the highest level that is reached during the year. Of course, the seasonal high groundwater table varies from year to year, primarily due to rainfall variations from year to year.

For a typical year in Manatee County, over 60% of the annual rainfall occurs during the four months of June through September. During this period, the groundwater table gradually rises to its highest level, which typically occurs in August to September. During the relatively dry portion of the year (from October to May), the groundwater table recedes to lower levels, typically reaching the lowest level in May.

The U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS), defines the seasonal high groundwater table as the highest level of a saturated zone in the soil in most years. This definition refers to a saturated zone, rather than the true groundwater table, which is defined above. Due to capillary rise, the saturated zone may extend a few to several inches above the groundwater table. This is because the capillary zone is a saturated zone above the groundwater table where the fluid (pore water) pressure is less than atmospheric pressure. Therefore, water from the capillary zone will not flow into a borehole which penetrates the aquifer. Only in the area below the groundwater table, where the pore water pressure is greater than

atmospheric pressure, will the water flow into an open borehole. The height of capillary rise is generally less than six inches above the groundwater table in most of the surficial sandy soils typical of the area, but may be greater if the surficial soils are more silty or clayey. The seasonal high groundwater table may, therefore, be somewhat lower than that reported in the NRCS soil surveys.

In the NRCS soil surveys, a range of seasonal high groundwater tables is listed for each of the defined surficial soil types. The groundwater table is estimated to be at or above this level for at least one month during most years. These estimates are based mainly on evidence of a saturated zone (grayish colors or mottles) and are generally applicable to an undrained soil condition (i.e. no artificial drainage).

The Southwest Florida Water Management District (SWFWMD) defines the seasonal high groundwater table as the elevation to which the groundwater table can be expected to rise during a normal wet season. For the purpose of designing stormwater management systems, it is our objective to estimate the seasonal high groundwater table as the elevation the groundwater table is expected to be at or above for no more than a few (approximately two to four) weeks during a year of average climatic conditions. Our estimated seasonal high groundwater tables for the site will be presented later in this report.

4.2 Review of NRCS Soil Survey

The United States Department of Agriculture, Natural Resources Conservation Service (NRCS) "Soil Survey of Manatee County, Florida" (issued 1983) indicates the predominant surficial soil type at the site to be Chobee loamy fine sand, but with a smaller area of Bradenton fine sand

(limestone substratum) on the northwest portion of the site. Selected properties of these soil types are summarized in **Table 1** of **Appendix II.**

The NRCS indicates the seasonal high groundwater table to be at a depth in the range of 0.0 to 1.0 foot below the ground surface for both of these soil types. Our site-specific estimates of the seasonal high groundwater table will be discussed in **Section 5.1** of this report.

5.0 ANALYSES AND RECOMMENDATIONS

The existing ground surface elevation at each of our test locations was determined by plotting the locations onto a topographic survey of the site, supplied by ZNS Engineering. The existing and seasonal high groundwater table and other subsurface elevations were then referenced to the ground surface elevation. These elevations should be considered accurate only to the degree implied by the method used.

5.1 Seasonal High Groundwater Table

The seasonal high groundwater table was estimated at the boring locations, based upon our review of the NRCS Soil Survey and our field explorations. In particular, the soil stratification and coloration observed in the shallow (upper two to three feet) soil spoon samples and in the hand auger borings were noted for indicators of normal high groundwater table levels.

The existing ground surface, existing groundwater table and estimated seasonal high groundwater table for each location are summarized in Table 2 of Appendix II. Subsurface conditions did not allow a reliable determination of the seasonal high groundwater table at Boring No. 4, however.

5.2 Pavement Base

We understand that the proposed construction includes a parking lot pavement. Boring Nos. 3 and 4 were performed within the proposed pavement areas. In general, the upper 1.0 to 1.5 feet of the soils are relatively well suited as a pavement subgrade, if stabilized. The clayey fine sands (SC) encountered below this depth would be a poor quality subgrade, however. These clayey soils may need to be undercut within the pavement area, if they occur within a depth of less than 1.0 foot below the proposed bottom of base elevation.

For the subject site, we recommend a flexible (asphaltic concrete) pavement with a cement stabilized base, overlying a stabilized (Florida DOT Section 160) subgrade. It was not within our scope of work to recommend specific pavement layer thicknesses. We do, however, recommend that the technical specification included in **Appendix III** be used for the cement-stabilized base material.

Due to the relatively poor drainage conditions of the soils, we do not recommend an non-cemented base material, such as shell base or crushed concrete, unless some form of underdrain system is also incorporated. Underdrains should not be necessary, however, for the cement stabilized base, as long as the elevation of the bottom of the base is at least 1.0 foot above the estimated seasonal high groundwater table elevation.

5.3 Anomaly at Boring No. 4

At Boring No. 4, a void was encountered from a depth of approximately 0.75 to 2.0 feet. It appeared that a relatively thin sheet of plastic-like material was penetrated at 0.75 feet but only soil was retrieved in the sample bucket. Due to the gravel encountered in the overlying and

underlying soils, this may indicate a subsurface absorption bed or drainfield. Prior to construction, we recommend that additional hand auger borings or shallow backhoe test pits be performed in this area to better define this condition. If subsurface drain fields, buried debris or similar occur in this area, they will need to be excavated to their full horizontal and vertical extent, beneath the proposed pavement area, and replaced with clean compacted engineered fill.

6.0 CLOSURE

The analyses and recommendations submitted in this report are based upon the results of subsurface borings performed at the locations indicated on the attached Figure 1. This report does not reflect any variations which may occur between the borings. While the borings are representative of the subsurface conditions at the respective locations and for their respective vertical reaches, local variations characteristic of the subsurface materials of the region are anticipated and may be encountered.

The boring logs and related information are based upon the driller's logs and visual examination of selected samples in the laboratory. The delineation between soil types shown on the logs is approximate, and the description represents our interpretation of the subsurface conditions at the designated boring location on the particular date drilled. The absence of a groundwater table listed on a boring log does not indicate that the groundwater table is not within the boring depth, unless expressly stated so.

APPENDIX I

SOIL BORING, SAMPLING & TEST METHODS
and
SOIL BORING LOGS

SOIL BORING, SAMPLING AND TESTING METHODS

Hand Auger Borings

Hand auger borings are used, if soil conditions are favorable, when the soil strata are to be determined within a shallow (approximately 5 to 9 feet) depth or when access is not available to power drilling equipment. A 3-inch diameter, hand bucket auger with a cutting head is simultaneously turned and pressed into the ground. The bucket auger is retrieved to the surface at approximately 6-inch intervals and its contents emptied for inspection. The soil sample so obtained is classified and representative samples put in bags or jars and transported to the laboratory for further classification and testing.

Soil Probe Sampler

The soil probe sampler is used when a more accurate definition of the shallow soil stratification/coloration is desired. A 1-inch diameter, spoon-type probe is pressed or driven into the soil by hand. The probe is retrieved to the surface at approximately 12-inch to 24-inch intervals (depending on the spoon length and soil conditions) and its contents inspected and classified. This method avoids most of the soil disturbance that occurs with auger or hand auger sampling. The total sampling depth is typically limited to 2 to 3 feet below the ground surface, depending upon soil and water table conditions.

Laboratory Test Methods

Soil samples returned to our laboratory are examined by a geotechnical engineer or geotechnician to obtain more accurate descriptions of the soil strata. Laboratory testing is performed on selected samples as deemed necessary to aid in soil classification and to further define engineering properties of the soils. The test results are presented on the soil boring logs at the depths at which the respective sample was recovered, except that grain size distributions or selected other test results may be presented on separate tables, figures or plates as described in this report. The soil descriptions shown on the logs are based upon a visual-manual classification procedure in general accordance with the Unified Soil Classification System (ASTM D-2488-84) and standard practice. Following is a list of abbreviations which may be used on the boring logs or elsewhere in this report.

-200 - Fines Content (percent passing the No. 200 sieve); ASTM D-1140
DD - Dry Density of Undisturbed Sample; ASTM D-2937
Gs - Specific Gravity of Soil; ASTM D-854
k - Hydraulic Conductivity (Coefficient of Permeability)
LL - Liquid Limit; ASTM D-423
OC - Organic Content; ASTM D-2974
pH - pH of Soil; ASTM D-2976
PI - Plasticity Index (LL-PL); ASTM D-424
PL - Plastic Limit; ASTM D-424
Qp - Unconfined Compressive Strength by Pocket Penetrometer;
Qu - Unconfined Compressive Strength; ASTM D-2166 (soil), D-2938 (rock)
SL - Shrinkage Limit; ASTM D-427
USCS - Unified Soil Classification System; ASTM D-2487, D-2488
w - Water (Moisture) Content; ASTM D-2216

BORING LOCATION: see Figure 1

DATE DRILLED: 6/17/10 **START:** **FINISH:**
GROUND SURFACE ELEVATION:
WATER TABLE DEPTH: 3.9 **TIME:** **DATE:** 6/17/10

CLIENT: Schenkel Shultz Architects
PROJECT: Palmetto Park and Ride
LOCATION: 19th Street West, Palmetto, Manatee County, Florida
DRILL CREW: MO **LOGGED BY:** MO

DRILL MAKE & MODEL: _____ **BIT:** 3.5" dia. bucket auger **DRILLING RODS:** _____
DRILLING METHOD: soil spoon to 2', then hand auger **WEATHER CONDITIONS:** _____

DEPTH, FT.	SPT N-VALUE	SAMPLE NO.	GRAPHIC LOG	USCS	SOIL DESCRIPTION	WATER CONTENT (%)	PERCENT FINES	ORGANIC CONTENT	LIQUID LIMIT	PLAST. INDEX
0		1		SP-SM	dark gray fine sand with silt					
1		2		SP	dark gray fine sand					
2		3		SC	grayish brown clayey fine sand					
3		4		SC	black clayey fine sand (slightly mucky)		26			
4		5		SM-SC	dark brown clayey silty fine sand					
5		6		CL-CH	gray sandy clay with gravel					
		7		MH	gray sandy elastic silt with gravel					
6		8			end of boring					
7										

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

REVIEWED BY: Jerry H. Kuehn, P.E. **FILE NO:** 10-7224 **BORING NO.:** 1

BORING LOCATION: see Figure 1

DATE DRILLED: 6/17/10 **START:** **FINISH:**
GROUND SURFACE ELEVATION:
WATER TABLE DEPTH: 4.4 **TIME:** **DATE:** 6/17/10

CLIENT: Schenkel Shultz Architects
PROJECT: Palmetto Park and Ride
LOCATION: 19th Street West, Palmetto, Manatee County, Florida
DRILL CREW: MO **LOGGED BY:** MO

DRILL MAKE & MODEL: _____ **BIT:** 3.5" dia. bucket auger **DRILLING RODS:** _____
DRILLING METHOD: soil spoon to 2', then hand auger **WEATHER CONDITIONS:** _____

DEPTH, FT.	SPT N-VALUE	SAMPLE NO.	GRAPHIC LOG	USCS	SOIL DESCRIPTION	WATER CONTENT (%)	PERCENT FINES	ORGANIC CONTENT	LIQUID LIMIT	PLAST. INDEX
0		1		SP-SM	dark gray fine sand with silt (trace gravel)					
1		2		SP	dark gray fine sand					
2		3		SC	grayish brown clayey fine sand					
3		4		SM-SC	grayish brown clayey silty fine sand					
4		5		SC	black clayey fine sand (slightly mucky)					
5		6		SC	dark brownish gray clayey fine sand					
6		7		MH	gray sandy elastic silt with gravel					
7					end of boring					

Ardaman & Associates, Inc.
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REVIEWED BY: Jerry H. Kuehn, P.E. **FILE NO:** 10-7224 **BORING NO.:** 2

BORING LOCATION: see Figure 1

DATE DRILLED: 6/17/10 **START:** **FINISH:**

GROUND SURFACE ELEVATION:

WATER TABLE DEPTH: 4.6 **TIME:** **DATE:** 6/17/10

CLIENT: Schenkel Shultz Architects

PROJECT: Palmetto Park and Ride

LOCATION: 19th Street West, Palmetto, Manatee County, Florida

DRILL CREW: MO **LOGGED BY:** MO

DRILL MAKE & MODEL: _____ **BIT:** 3.5" dia. bucket auger **DRILLING RODS:** _____

DRILLING METHOD: soil spoon to 2', then hand auger **WEATHER CONDITIONS:** _____

DEPTH, FT.	SPT N-VALUE	SAMPLE NO.	GRAPHIC LOG	USCS	SOIL DESCRIPTION	WATER CONTENT (%)	PERCENT FINES	ORGANIC CONTENT	LIQUID LIMIT	PLAST. INDEX
0		1		SP-SM	dark gray fine sand with silt					
		2		SP	brown fine sand					
				SP	dark grayish brown fine sand					
1		3								
				SC	black clayey fine sand (slightly mucky)					
		4				19		3.7		
2										
3										
4				SC	dark brownish gray clayey fine sand					
		5								
				MH	olive gray sandy elastic silt with gravel					
5		6								
		7		MH	gray sandy elastic silt with gravel					
6					end of boring					
7										

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REVIEWED BY: Jerry H. Kuehn, P.E. **FILE NO:** 10-7224 **BORING NO.:** 3

BORING LOCATION: see Figure 1

DATE DRILLED: 6/17/10 **START:** **FINISH:**

GROUND SURFACE ELEVATION:

WATER TABLE DEPTH: 4.2 **TIME:** **DATE:** 6/17/10

CLIENT: Schenkel Shultz Architects

PROJECT: Palmetto Park and Ride

LOCATION: 19th Street West, Palmetto, Manatee County, Florida

DRILL CREW: MO **LOGGED BY:** MO

DRILL MAKE & MODEL: _____ **BIT:** 3.5" dia. bucket auger **DRILLING RODS:** _____

DRILLING METHOD: soil spoon to 2', then hand auger **WEATHER CONDITIONS:** _____

DEPTH, FT.	SPT N-VALUE	SAMPLE NO.	GRAPHIC LOG	USCS	SOIL DESCRIPTION	WATER CONTENT (%)	PERCENT FINES	ORGANIC CONTENT	LIQUID LIMIT	PLAST. INDEX
0		1		SP-SM	dark gray fine sand with silt (trace gravel)					
1					(void)					
2		2		SP-SM	dark brown fine sand with silt & gravel					
				SC	black clayey fine sand (slightly mucky)					
3		3				26		3.5		
4				SC	dark gray clayey fine sand					
5		4								
		5		MH	olive gray sandy elastic silt with gravel					
6					end of boring					
7										

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

REVIEWED BY: Jerry H. Kuehn, P.E. **FILE NO:** 10-7224 **BORING NO.:** 4

APPENDIX II

TABLES

Table 1
SELECTED PROPERTIES OF SURFICIAL SOILS

Map Symbol	Hydrologic Group	High Water Table (feet)	Depth (inch)	Unified Soil Classification	Percent Passing No. 200 Sieve	Percent Clay	Permeability (feet/day)	Available Water Capacity (feet/feet)
5	B/D	0.0 - 1.0	0 - 6	SP-SM	5 - 12	1 - 6	12 - 40	0.05 - 0.10
			6 - 13	SP-SM, SM	5 - 25	5 - 13	12 - 40	0.05 - 0.10
			13 - 47	SM-SC, SC	20 - 35	10 - 18	1.2 - 4	0.10 - 0.15
			47 - 77	(rock)	-----	-----	-----	-----
			77 - 80	SP-SM, SM, SM-SC, SC	5 - 45	5 - 25	1.2 - 12	0.05 - 0.15
13	B/D	0.0 - 1.0	0 - 8	SP-SM, SM	12 - 25	7 - 15	4 - 12	0.10 - 0.15
			8 - 51	SC	25 - 45	20 - 35	<0.4	0.12 - 0.17
			51 - 80	SP-SM, SM, SC, SM-SC	12 - 45	7 - 20	0.4 - 12	0.06 - 0.10

MAP SYMBOL LEGEND

5 - Bradenton fine sand, limestone substratum
13 - Chobee loamy fine sand

UNIFIED SOIL CLASSIFICATION LEGEND

SP	- Poorly graded sand
SP-SM	- Poorly graded sand with silt
SM	- Silty sand
SP-SC	- Poorly graded sand with clay
SC	- Clayey sand
SM-SC	- Clayey, silty sand
CL	- Lean clay
CH	- Fat clay
PT	- Peat (muck)

Source: Natural Resources Conservation Service (1983)

Table 2
EXISTING AND SEASONAL HIGH WATER TABLE

Boring Number	Existing Ground Surface Elevation (feet, NGVD)	Existing Groundwater Table			Seaonal High Groundwater Table	
		Depth (feet)	Elevation (feet, NGVD)	Date (Day-Mo-Yr)	Depth (feet)	Elevation (feet, NGVD)
1	11.3	3.9	7.4	17-Jun-10	1.3	10.1
2	11.7	4.4	7.3	17-Jun-10	1.5	10.2
3	12.1	4.6	7.5	17-Jun-10	1.7	10.4
4	11.8	4.2	7.6	17-Jun-10	N.D.	N.D.

APPENDIX III

TECHNICAL SPECIFICATIONS FOR CEMENT-STABILIZED BASE

TECHNICAL SPECIFICATIONS

CEMENT-STABILIZED BASE

1. DESCRIPTION

1.1 The work specified in this section consists of the construction of a cement-stabilized base course composed of crushed concrete, shell, or other material having a minimum LBR of 90 and Portland cement uniformly mixed, compacted, finished and cured in accordance with these specifications, and shall conform to the lines, grades, thicknesses and typical cross-sections shown on the plans. The base shall be designed to have a minimum in situ compressive strength of 150 psi.

2. MATERIALS

2.1 Portland cement shall comply with the latest specifications for Portland cement, AASHTO M-85, or AASHTO M-134 or ASTM C-150, for the type specified. A one (1) cubic foot sack of Portland cement shall be considered to weight 94 pounds.

2.2 Water for use with cement shall be clean and free of substances deleterious to the hardening of the cement-stabilized base.

2.3 Material to be blended with Portland cement shall consist of crushed concrete, shell, or limerock having a minimum LBR of 90.

3. EQUIPMENT

3.1 For performing the work specified in this section, the Contractor shall use a portable or stationary stabilization plant capable of producing uniformly blended and proportioned mixture of cement base material and water.

4. CONSTRUCTION METHODS

4.1 Preparation

A. Before other construction operations are begun, the area to be paved shall be graded and shaped as required to construct the cement-stabilized base in conformance with the grades, lines, thicknesses and typical cross-sections shown on the plans. Any additional soil needed shall be placed as directed by the Engineer. The subbase shall be firm and able to support (without displacement) the construction equipment and compaction hereinafter specified. Any unsuitable soil or materials, including material retained on a three-inch sieve, shall be removed and replaced with acceptable material. Soft or yielding subgrade shall be corrected and made stable before construction proceeds.

B. The subbase in both cuts and fills shall be stabilized to an LBR of at least 40 and compacted to a density of 98% of the maximum density, as determined by AASHTO T-180 (Modified Proctor). The subbase shall be shaped, prior to making the density tests.

4.2 Placement and Compaction

The mixture shall be placed within ±2% of the design moisture content. The loose mixture shall be uniformly compacted to the specified density within two hours. During compaction operations, shaping may be required to obtain uniform compaction and required grade and cross-section.

4.3 Finishing

After the mixture has been compacted, the surface of the cement-treated base shall be shaped, if necessary, to the required lines, grades and cross-section. During shaping operations, the surface shall be lightly scarified to loosen any imprints left by the compacting or shaping equipment. The resulting surface shall then be compacted to the specified density with vibratory steel-wheel or pneumatic tire rollers, or both. Surface compaction and finishing shall be done in such a manner as to produce, in not longer than 5 hours, a smooth, dense surface, free of surface compaction planes, cracks, ridges or loose materials.

4.4 Uniformity

Any portion of the cement-treated base that has a density less than 98% of the design density shall be corrected by additional rolling. If the time limits set forth herein have been exceeded, the base shall be left undisturbed and shall be tested (after 7 days of curing) by the Engineer to determine its suitability. If it is found unsuitable, it shall be removed and replaced by the Contractor without additional compensation. The Contractor may, at his option, remove and replace the deficient base rather than wait for the results of the 7-day test.

5. CONSTRUCTION JOINTS

5.1 At the end of each day's construction, a straight transverse construction joint shall be formed by cutting back into the completed work to form a true vertical face. The construction joint thus formed shall be located so as to exclude all of that part of the base at the end of the run from being considered a part of the finished base if it does not have full depth, it is not thoroughly compacted, is not properly proportioned, or is not properly mixed.

6. CURING

6.1 After the cement-treated base has been finished as specified herein, it shall be protected against drying for 7 days, as specified herein. The finished base shall be maintained in a moist condition by application of water until the bituminous curing material is applied.

6.2 At the time the bituminous material is applied, the cement-treated base surface shall be dense, free of all loose and extraneous material, and shall contain sufficient moisture to permit penetration of the bituminous material. Water shall be applied in sufficient quantity to fill the surface voids of the cement-treated base immediately before the bituminous curing material is applied.

7. OPENING TO TRAFFIC

7.1 After the 7-day curing period, the completed portion may be opened to all traffic, provided the base is either protected or has hardened sufficiently to prevent marring or distorting of the surface by the equipment or traffic, and provided the curing, as specified, is not impaired.

A. The curing material shall be adequately maintained during the 7-day protection period so that all of the cement-treated base will be covered effectively during this period.

B. Finished portions of the base that are used by equipment during the construction of an adjoining section shall be protected in such a manner as to prevent the equipment from marring or damaging the completed work.

8. MAINTENANCE

8.1 The Contractor shall maintain the base to a true and satisfactory surface until the wearing surface is constructed. Should any repairs or patching be necessary, they shall extend to the full depth of the base and shall be made in a manner that will assure restoration of a uniform base course conforming to the requirements of these applications. In no case shall repairs be made by adding a thin layer of base to the completed work. The Contractor may, at his option, make full-depth repairs with concrete or asphalt to small or minor areas such as manholes, inlets or the like.

9. TESTING

9.1 Tests are a necessary part of the cement-treated base construction. At least one each of the following will be made by the laboratory unless otherwise specified.

A. Mix Design - A mix design shall be submitted to the Engineer at least 14 days prior to initiating base construction. The mix design shall be conducted using representative samples of the material to be utilized, obtained from the same supplier that is to be used on the project. The mix design shall be performed using the procedures of AASHTO D-134, using moisture contents that are representative of the material being utilized. The mix design shall include a design Portland cement content, a design moisture content (i.e., the moisture content of the LBR=90 material at the time it is mixed with the Portland cement) and a design density (i.e., the density of the compacted specimen when compacted at the design moisture content and with the design cement content added).

B. The stockpile to be utilized should not be segregated. Moisture content and gradation shall be conducted for every 6,500 SY of cement-treated base. If moisture content or gradations vary, a mix design should be conducted on each variation.

C. Laboratory Density - Laboratory density (AASHTO D-134) at the field moisture content and with the design cement content corresponding to this moisture content shall be conducted prior to placement of base.

D. Field Density - One (1) density test shall be taken per each 500 SY maximum

area. The field density shall be at least 98% of the laboratory density (AASHTO T-134) which corresponds to the area being tested.

E. Bag Samples - Bag samples shall be taken at least once daily and at least one per 1,500 SY. Test specimens from the bag samples shall be molded in the laboratory at the field moisture content by the Standard Proctor compaction method (AASHTO T-99). Each molded specimen shall be 4 inches in diameter and 4.5 inches in height. The specimens shall be cured for 7 days and tested for compressive strength. Prior to testing for compressive strength, the specimens shall be submerged in water for a minimum of 4 hours. The compressive strength of the specimens shall be no less than 200 psi and should be in the range of 200 to 300 psi.

F. Cores Samples - 6-inch diameter cores shall be taken and tested to verify compressive strength and thickness at a frequency of at least one per 1,500 SY, but no less than one per day. Core samples shall be obtained prior to placement of asphalt on the base, but no less than 14 days after base placement. The compressive strength will be acceptable if the cores indicate a compressive strength no less than 150 psi throughout the design base thickness.

G. Seven-Day Inspection - After receipt of the 7-day test report from the laboratory stating that there is a satisfactory cement-treated base, the Engineer may allow the wearing surface to be placed immediately.

9.2 All tests shall be performed by a testing laboratory, approved by the Engineer. The testing laboratory shall be under the direction of the Professional Engineer with at least five (5) years experience in materials testing.

10. GRADE STAKES

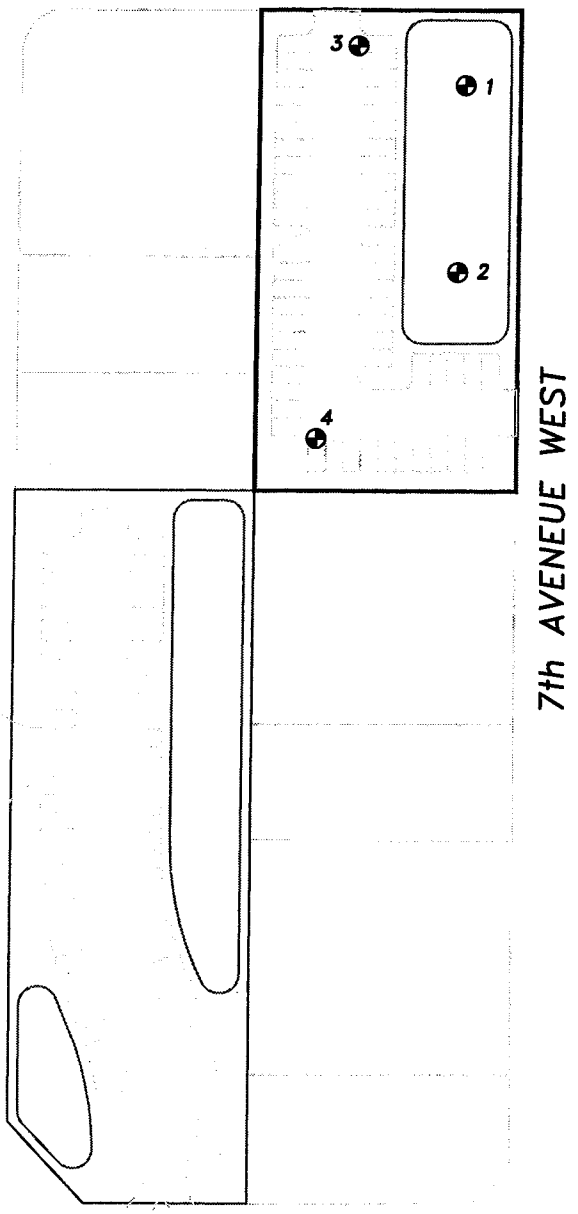
10.1 The Contractor shall make every effort to preserve the grade stakes until the job is completed. Destroyed or moved stakes shall be replaced at the Contractor's expense.

11. METHOD OF MEASUREMENT

11.1 The quantity to be paid for under this section shall be the number of square yards of cement-treated base course actually completed and accepted. In determining the quantity of base course, the length to be used in the calculation shall be the actual length measured along the surface of the base and the width shall be the width of the base actually constructed, both within the near lines shown on the plans.

12. BASIS OF PAYMENT

12.1 This work shall be paid for at the contract unit price per square yard of completed and accepted base course. The contract unit price shall be full payment for furnishing all materials, equipment, tools, labor, testing and incidentals necessary to complete the work and for carrying out the maintenance provisions in this specification.



TEST BORING LOCATIONS

SCALE: 1"=100'

Base Drawing By: ZNS engineering

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

Test Locations
Palmetto Park & Ride
Manatee County, Florida

DRAWN BY: KGS	CHECKED BY:	DATE: 6/18/10
FILE NO. 10-7224	APPROVED BY:	FIGURE: 1

Division 05
Metals

SECTION 05 52 00
ALUMINUM HANDRAILS AND RAILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes aluminum pipe handrails and railings

1.2 SUBMITTALS

A. Shop drawings detailing fabrication and erection of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide templates for anchors and bolts specified for installation under other Sections.

B. Welder certificates signed by Contractor certifying that welders comply with requirements specified under the "Quality Assurance" Article.

C. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include a list of completed projects with project name, addresses, names of architects and owners, and other information specified.

D. Shop drawings shall indicate loading requirements as specified herein and be certified and sealed by a Registered Structural Engineer in the state of **<%States%>** to be in conformance with all requirements as specified herein and in accordance with all State and local codes and regulations.

1.3 QUALITY ASSURANCE

A. Fabricator Qualifications: Firm experienced in producing metal fabrications similar to those indicated for this Project with a record of successful in-service performance, and with sufficient production capacity to produce required units without delaying the Work.

B. Welding Standards: Comply with applicable provisions of AWS D1.2 “Structural Welding Code–Aluminum”.

1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone re-certification.

C. Inserts and Anchorages: Furnish inserts and anchoring devices which must be set in concrete or built into masonry for installation of stair work. Provide setting drawings, templates, instructions, and directions for installation of anchorage devices. Coordinate delivery with other work to avoid delay.

1. See Concrete and Masonry Sections of these Specifications for installation of inserts and anchorage devices.

D. Shop Assembly: Pre-assemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for re-assembly and coordinated installation.

E. Structural Performance: Design, engineer, fabricate, and install the following metal fabrications to withstand the following structural loads without exceeding the allowable design working stress of the materials involved, including anchors and connections.

1. Handrails: 200 pounds, concentrated load applied at any point in any direction and 50 pounds per linier foot applied in any direction.
2. Guardrails:

a. 200 pounds, concentrated load applied at any point in any direction
b. 50 pounds per linier foot applied in any direction
c. 200 pound, concentrated load applied on a one foot area at any point in the system

3. Loading conditions need not be assumed to act concurrently but each shall be applied to produce the maximum stress in each respective component or any of the supporting components.

1.4 FLORIDA ACCESSIBILITY CODE FOR BUILDING CONSTRUCTION

A. Handrails and railings shall conform with the Accessibility Requirements Manual from the Florida Department of Community Affairs, Florida Board of Building Codes and Standards.

B. Handrails and railings shall conform to NFPA 101, 2000, Life Safety Code.

PART 2 – PRODUCTS

2.1 ALUMINUM MANUFACTURERS

A. Subject to compliance with requirements, aluminum handrails and railings shall be as fabricated by one of the following:

1. Superior Aluminum Products, Inc., Russia, Ohio
2. Petersen Metal Products, Inc., Odessa, Florida
3. Poma Corporation, West Palm Beach, Florida
4. Architectural Metal Works, Tarpon Springs, Florida

2.2 MATERIALS

A. Aluminum

1. Aluminum Surfaces, General: For fabrication of miscellaneous metal work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names, and roughness.
2. Aluminum Pipe: Formed from extruded 6063-T5, 1-1/2" and 3" outside diameter aluminum pipe. Formed Elbows from extruded 6063-T4 aluminum.
3. Accessories: Cast from ANSI 713 alloy.

B. Nonshrink, Nonmetallic Grout: refer to Section 05 50 00 – Metal Fabrications

C. Fasteners

1. General: Provide zinc-coated fasteners for exterior use or where built into exterior walls. Select fasteners for the type, grade, and class required.
2. Masonry Anchorage Devices: Expansion shields, FS FF--325.
3. Toggle Bolts: Tumble-wing type, FS FF-B-588, type, class, and style as required.
4. Concrete Anchor Bolts: Hexagon head "Kwik Bolt" by Hilti Fastening System, Tulsa, Oklahoma.

D. Finish: Class I Clear Anodized per AA-M12C22A41 complying with AAMA 607.1.

2.3 ALUMINUM PIPE HANDRAILS AND RAILINGS

A. Fabricate pipe railings to dimensions and details shown with smooth bends and welded joints ground smooth and flush.

B. Interconnect railing and handrail members by butt-welding or welding with internal connectors, at fabricator's option, unless otherwise indicated.

1. At tee and cross intersections, provide coped joints.
2. At bends, interconnect pipe by means of prefabricated elbow fittings or flush radius bends, as applicable, or radiuses indicated.
3. Form bends by use of prefabricated elbow fittings and radius bends.

C. Form simple and compound curves by bending pipe in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross-section of pipe throughout entire bend without bucking, twisting, or otherwise deforming exposed surfaces of pipe.

D. Provide wall returns at end of wall-mounted handrails, except where otherwise indicated.

E. Close exposed ends of pipe by welding 3/16-inch thick aluminum plate in place or by use of prefabricated fittings.

F. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnections of pipe and attachment of railings and handrails to other work. Furnish inserts and other anchorage devices for connecting railings and handrails to concrete or masonry work.

G. Railings and Handrails: Comply with applicable requirements specified elsewhere in this Section for aluminum pipe railing sand handrails, and as follows:

1. Railings may be bent at corners, rail returns and wall returns, instead of using prefabricated fittings.
2. Connect railing posts to stair framing by direct welding, unless otherwise indicated.

PART 3 - EXECUTION

3.1 INSTALLATION OF HANDRAILS

A. Secure handrails to wall with wall brackets and end fittings. Provide bracket with not less than 1-1/2 inch clearance from inside face of handrail and finished wall surface. Locate brackets as indicated or, if not indicated, at spacing required for design loading. Secure wall brackets and wall return fittings to building construction as follows:

1. Use type of bracket with predrilled hole for exposed bolt anchorage.
2. For concrete and solid masonry anchorage, use drilled-in expansion shield and either concealed hanger bolt or exposed lag bolt, as applicable.
3. For hollow masonry anchorage, use toggle bolts having square heads.

3.2 INSTALLATION OF RAILINGS

A. Adjust railings prior to anchoring to ensure matching alignment at abutting joints. Space posts at spacing indicated, or if not indicated, as required by design loadings. Plumb posts in each direction. Secure posts and railings ends to building construction as follows:

1. Anchor posts in concrete by means of pipe sleeves, preset and anchored into concrete. After posts have been inserted into sleeves, fill annular space between post and sleeve solid with nonshrink grout.

    a. Leave anchorage joint exposed; wipe off excess grout and leave 1/8 inch build-up, sloped away from post. For installation exposed on exterior or to flow of water, seal grout to comply with grout manufacturer's directions.

2. Anchor posts to metal surfaces with oval flanges, angle type, or floor type as required by conditions, attach posts as indicated using fittings designed and engineered for this purpose.
3. Anchor rail ends into concrete and masonry with aluminum round flanges welded to rail ends and anchored into wall construction with lead expansion shields and bolts.

4. Anchor rail ends to aluminum with aluminum oval or round flanges welded to rail ends and bolted to structural aluminum members, unless otherwise indicated.
5. Railings shall be isolated when mounted to dissimilar materials.

END OF SECTION 05 52 00

Division 10

Specialties

MCAT – Palmetto Park & Ride Sign Specifications

Manufacturer:
Gulf Coast Signs of Sarasota, Inc.
1713 Northgate Blvd
Sarasota, FL 34234
(941) 355-8841 FAX (941) 351-3154
Info.GCS@gulfcoastsigns.com

0r Architect approved equal.

A- FABRICATION:

a. Refurbish existing double faced illuminated monument sign
   i. Copy: TRANSIT PARK & RIDE
   ii. Materials – 3M Reflective Vinyl, White #680-10
   iii. Copy Size – See drawing attached; approximate size of letters 3.5"
b. Traffic Control Signs
   i. Quantity – Two (2)
   ii. Non-illuminated, single face
   iii. Cabinets to be constructed using 0.125 aluminum faces and 0.063 aluminum filler over internal frame
   iv. Cabinet 6" deep, 4' wide by 4'-6" height
   v. Welded constructions to meet best industry standards
   vi. Product must be fabricated to avoid any grinding marks
   vii. Engineering – vendor shall provide all necessary engineering required to obtain permit. Vendor shall provide all necessary structural engineering for foundation as necessary per local codes and regulations. Vendor is responsible for all permitting and engineering associated with signage.
   viii. Finish – Smooth surface
   ix. Color Schedule – Matthews paint as specified below
      1. Use Matthews low VOC paint
      2. Painted to match PPG19803, Blue Metallic
      3. Red stripe painted to match 3M vinyl #3630-33
      4. Copy – 3M reflective vinyl, #680-10 White

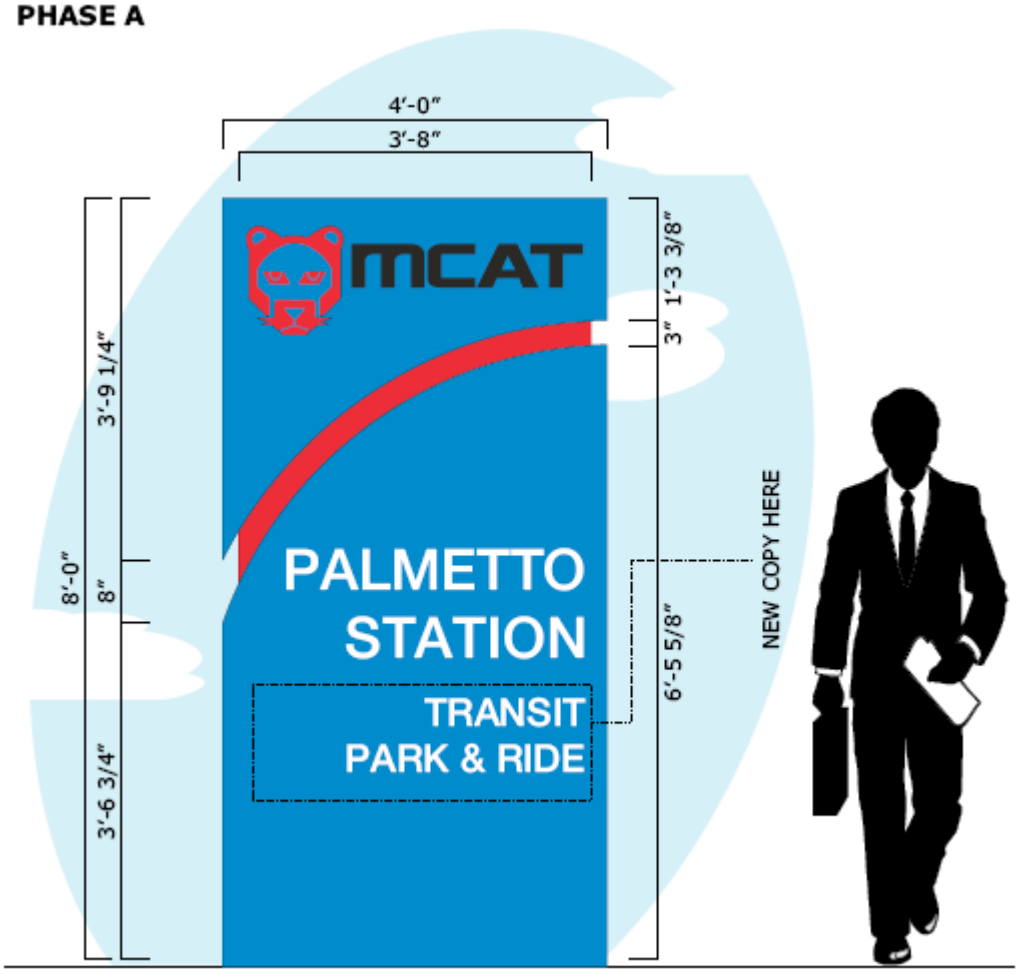
B- INSTALLATION:

a. No engineering requirement
b. Foundation must be sized to be consistent with local wind loading requirements and permitted through local permit agency.

c. Location – See architectural Site plan.

gulf coast signs
of sarasota, inc.

PHASE A



REFURBISH EXISTING DOUBLE FACED ILLUMINATED PYLON SIGN.

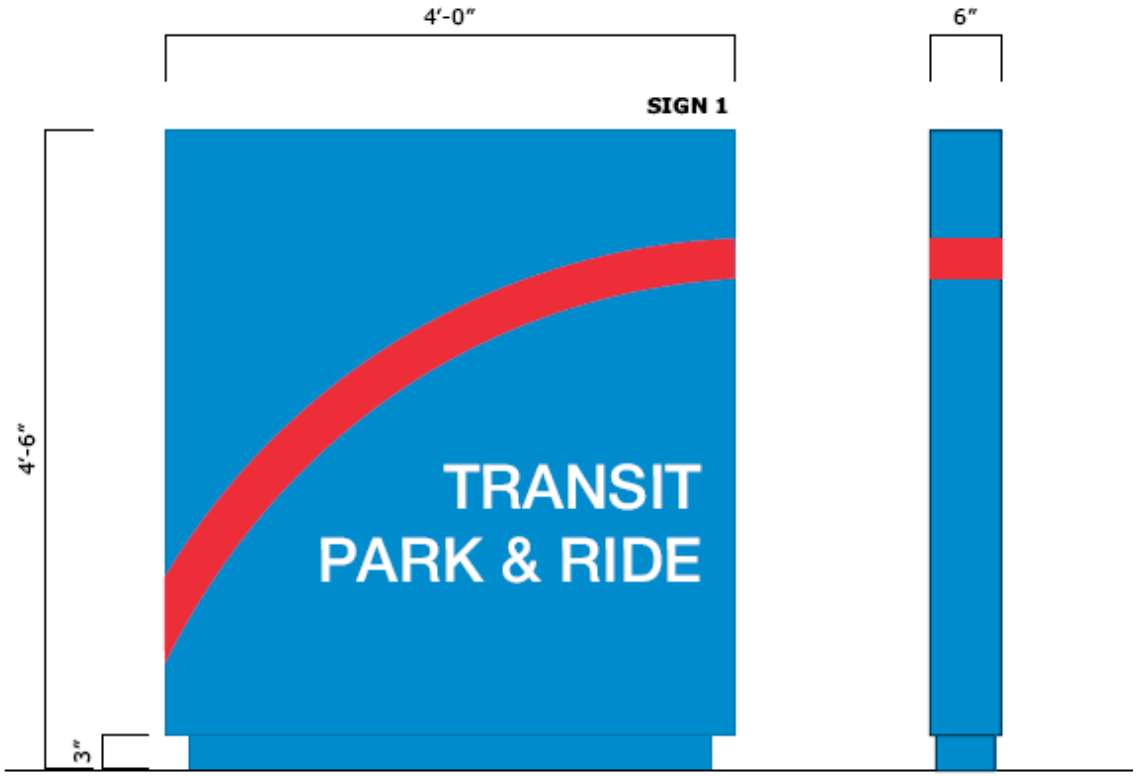
ADD NEW 3M REFLECTIVE VINYL COPY TO BOTH FACES OF EXISTING D/F PYLON SIGN IN FIELD TO MATCH EXISTING "PALMETTO STATION" COPY.

COLOR SCHEDULE:

3M VINYL
#680-10
WHITE REFLECTIVE

gulf coast signs
of sarasota, inc.

PHASE B



MANUFACTURE & INSTALL TWO (2) SINGLE FACED, NON ILLUMINATED TRAFFIC CONTROL SIGNS.

CABINET - .125 ALUMINUM FACES, .063 ALUMINUM FILLER OVER INTERNAL ANGLE FRAME.
COPY TO BE 3M VINYL APPLIED FIRST SURFACE. FINISH TO BE SMOOTH.

COLOR SCHEDULE:

PAINTED TO MATCH 3M VINYL #3630-33 (RED)	PAINTED TO MATCH PPG19803 BRIGHT BLUE METALLIC	3M VINYL #680-10 WHITE REFLECTIVE

Division 26

Electrical

SECTION 26 56 00
EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exterior luminaires with lamps and ballasts.
2. Luminaire-mounted photoelectric relays.
3. Poles and accessories.

1.2 STRUCTURAL ANALYSIS CRITERIA FOR POLE SELECTION

A. Dead Load: Weight of luminaire and its horizontal and vertical supports, lowering devices, and supporting structure, applied as stated in AASHTO LTS-4-M.

B. Live Load: Single load of 500 lbf, distributed as stated in AASHTO LTS-4-M.

C. Ice Load: Load of 3 lbf/sq. ft., applied as stated in AASHTO LTS-4-M Ice Load Map.

D. Wind Load: Pressure of wind on pole and luminaire and banners and banner arms, calculated and applied as stated in AASHTO LTS-4-M.

1. Basic wind speed for calculating wind load for poles 50 feet high or less is 130 mph.

a. Wind Importance Factor: 1.15.
b. Minimum Design Life: 25 years.
c. Velocity Conversion Factors: 1.0.

1.3 ACTION SUBMITTALS

A. Product Data: For each luminaire, pole, and support component, arranged in order of lighting unit designation. Include data on features, accessories, and finishes.

B. Shop Drawings: Anchor-bolt templates keyed to specific poles and certified by manufacturer.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with IEEE C2, "National Electrical Safety Code."

C. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, product(s) indicated on Drawings.

2.2 GENERAL REQUIREMENTS FOR LUMINAIRES

A. Luminaires shall comply with UL 1598 and be listed and labeled for installation in wet locations by an NRTL acceptable to authorities having jurisdiction.

1. LER Tests Incandescent Fixtures: Where LER is specified, test according to NEMA LE 5A.
2. LER Tests HID Fixtures: Where LER is specified, test according to NEMA LE 5B.

B. Lateral Light Distribution Patterns: Comply with IESNA RP-8 for parameters of lateral light distribution patterns indicated for luminaires.

C. Metal Parts: Free of burrs and sharp corners and edges.

D. Sheet Metal Components: Corrosion-resistant aluminum unless otherwise indicated. Form and support to prevent warping and sagging.

E. Housings: Rigidly formed, weather- and light-tight enclosures that will not warp, sag, or deform in use. Provide filter/breather for enclosed luminaires.

F. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position. Doors shall be removable for cleaning or replacing lenses. Designed to disconnect ballast when door opens.

G. Exposed Hardware Material: Stainless steel.

H. Plastic Parts: High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.

I. Light Shields: Metal baffles, factory installed and field adjustable, arranged to block light distribution to indicated portion of normally illuminated area or field.

J. Reflecting surfaces shall have minimum reflectance as follows unless otherwise indicated:

1. White Surfaces: 85 percent.
2. Specular Surfaces: 83 percent.
3. Diffusing Specular Surfaces: 75 percent.

K. Lenses and Refractors Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.

L. Luminaire Finish: Manufacturer's standard paint applied to factory-assembled and -tested luminaire before shipping. Where indicated, match finish process and color of pole or support materials.

M. Factory-Applied Finish for Steel Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

1. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning," to remove dirt, oil, grease, and other contaminants that could impair paint bond. Grind welds and polish surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or SSPC-SP 8, "Pickling."
2. Exterior Surfaces: Manufacturer's standard finish consisting of one or more coats of primer and two finish coats of high-gloss, high-build polyurethane enamel.

    a. Color: As selected from manufacturer's standard catalog of colors.

N. Factory-Applied Finish for Aluminum Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
2. Natural Satin Finish: Provide fine, directional, medium satin polish (AA-M32); buff complying with AA-M20; and seal aluminum surfaces with clear, hard-coat wax.
3. Class I, Clear Anodic Finish: AA-M32C22A41 (Mechanical Finish: medium satin; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.
4. Class I, Color Anodic Finish: AA-M32C22A42/A44 (Mechanical Finish: medium satin; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.

O. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps and ballasts. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.

1. Label shall include the following lamp and ballast characteristics:

    a. "USES ONLY" and include specific lamp type.
    b. Lamp tube configuration (twin, quad, triple), base type, and nominal wattage for compact fluorescent luminaires.
    c. Lamp type, wattage, bulb type (ED17, BD56, etc.) and coating (clear or coated) for HID luminaires.
    d. Start type (preheat, rapid start, instant start) compact fluorescent luminaires.
    e. ANSI ballast type (M98, M57, etc.) for HID luminaires.
    f. CCT and CRI for all luminaires.

2.3 BALLASTS FOR HID LAMPS

A. Comply with ANSI C82.4 and UL 1029 and capable of open-circuit operation without reduction of average lamp life. Include the following features unless otherwise indicated:

1. Ballast Circuit: Constant-wattage autotransformer or regulating high-power-factor type.

2. Minimum Starting Temperature: Minus 22 deg F.
3. Normal Ambient Operating Temperature: 104 deg F.
4. Ballast Fuses: One in each ungrounded power supply conductor. Voltage and current ratings as recommended by ballast manufacturer.

2.4 HID LAMPS

A. Metal-Halide Lamps: ANSI C78.43, with minimum CRI 65, and CCT color temperature 4000 K.

B. Pulse-Start, Metal-Halide Lamps: Minimum CRI 65, and CCT color temperature 4000 K.

2.5 GENERAL REQUIREMENTS FOR POLES AND SUPPORT COMPONENTS

A. Structural Characteristics: Comply with AASHTO LTS-4-M.

1. Wind-Load Strength of Poles: Adequate at indicated heights above grade without failure, permanent deflection, or whipping in steady winds of speed indicated in "Structural Analysis Criteria for Pole Selection" Article.
2. Strength Analysis: For each pole, multiply the actual equivalent projected area of luminaires and brackets by a factor of 1.1 to obtain the equivalent projected area to be used in pole selection strength analysis.

B. Luminaire Attachment Provisions: Comply with luminaire manufacturers' mounting requirements. Use stainless-steel fasteners and mounting bolts unless otherwise indicated.

C. Mountings, Fasteners, and Appurtenances: Corrosion-resistant items compatible with support components.

1. Materials: Shall not cause galvanic action at contact points.
2. Anchor Bolts, Leveling Nuts, Bolt Caps, and Washers: Hot-dip galvanized after fabrication unless otherwise indicated.
3. Anchor-Bolt Template: Plywood or steel.

D. Handhole: Oval-shaped, with minimum clear opening of 2-1/2 by 5 inches, with cover secured by stainless-steel captive screws. Provide on all, except wood poles.

E. Concrete Pole Foundations: Cast in place, with anchor bolts to match pole-base flange. Concrete, reinforcement, and formwork are specified in Section 033000 "Cast-in-Place Concrete."

F. Power-Installed Screw Foundations: Factory fabricated by pole manufacturer, with structural steel complying with ASTM A 36/A 36M and hot-dip galvanized according to ASTM A 123/A 123M; and with top-plate and mounting bolts to match pole base flange and strength required to support pole, luminaire, and accessories.

G. Breakaway Supports: Frangible breakaway supports, tested by an independent testing agency acceptable to authorities having jurisdiction, according to AASHTO LTS-4-M.

PART 3 - EXECUTION

3.1 LUMINAIRE INSTALLATION

A. Install lamps in each luminaire.

B. Fasten luminaire to indicated structural supports.

1. Use fastening methods and materials selected to resist seismic forces defined for the application and approved by manufacturer.

C. Adjust luminaires that require field adjustment or aiming. Include adjustment of photoelectric device to prevent false operation of relay by artificial light sources, favoring a north orientation.

3.2 POLE INSTALLATION

A. Alignment: Align pole foundations and poles for optimum directional alignment of luminaires and their mounting provisions on the pole.

B. Clearances: Maintain the following minimum horizontal distances of poles from surface and underground features unless otherwise indicated on Drawings:

1. Fire Hydrants and Storm Drainage Piping: 60 inches.
2. Water, Gas, Electric, Communication, and Sewer Lines: 5 feet.
3. Trees: 15 feet from tree trunk.

C. Embedded Poles with Tamped Earth Backfill: Set poles to depth below finished grade indicated on Drawings, but not less than one-sixth of pole height.

1. Dig holes large enough to permit use of tampers in the full depth of hole.
2. Backfill in 6-inch layers and thoroughly tamp each layer so compaction of backfill is equal to or greater than that of undisturbed earth.

D. Embedded Poles with Concrete Backfill: Set poles in augered holes to depth below finished grade indicated on Drawings, but not less than one-sixth of pole height.

1. Make holes 6 inches in diameter larger than pole diameter.
2. Fill augered hole around pole with air-entrained concrete having a minimum compressive strength of 3000 psi at 28 days, and finish in a dome above finished grade.
3. Use a short piece of 1/2-inch- diameter pipe to make a drain hole through concrete dome. Arrange to drain condensation from interior of pole.
4. Cure concrete a minimum of 72 hours before performing work on pole.

E. Raise and set poles using web fabric slings (not chain or cable).

3.3 CORROSION PREVENTION

A. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum by insulating fittings or treatment.

B. Steel Conduits: Comply with Section 260533 "Raceways and Boxes for Electrical Systems." In concrete foundations, wrap conduit with 0.010-inch- thick, pipe-wrapping plastic tape applied with a 50 percent overlap.

3.4 GROUNDING

A. Ground metal poles and support structures according to Section 260526 "Grounding and Bonding for Electrical Systems."

1. Install grounding electrode for each pole unless otherwise indicated.
2. Install grounding conductor pigtail in the base for connecting luminaire to grounding system.

B. Ground nonmetallic poles and support structures according to Section 260526 "Grounding and Bonding for Electrical Systems."

1. Install grounding electrode for each pole.
2. Install grounding conductor and conductor protector.
3. Ground metallic components of pole accessories and foundations.

END OF SECTION 26 56 00

SECTION 26 43 13
SURGE PROTECTIVE DEVICES (SPD)

PART 1 - GENERAL

1.1 SUMMARY

A. Surge protective devices on power circuits at facility entrances to protect the structure from lightning.

B. Surge protective devices on signal, data, and control lines at facility entrances to protect the structure from lightning.

1.2 SUBMITTALS

A. Drawings: Electrical and mechanical drawings shall be provided by the manufacturer which show unit dimensions, weights, mounting provisions, connection notes, wire size and wiring diagram. The manufacturer shall furnish an installation manual with installation notes, start-up and operating instructions for the specified system. Installation instructions shall clearly state whether the system requires an external overcurrent protection device to maintain the system's UL 1449 listing.

B. Independent Testing:

1. High exposure with the 10 x 1,000• s tests per IEEE C62.41.2 Section 7.2.
2. Life Cycle/Repetitive Testing per C62.45-2002 section B.38 minimum of 2,000 times.

C. National Electrical Code (NEC) 285 - Installation requirements for SPD.

1. Article 285.2, SPD must limit transient voltage by diverting or limiting surge current; it also should prevent continued flow of follow current while remaining capable of repeating these functions. SPD that utilize fuses must have repetitive surge capability that can survive its surge rating and meet UL 1449.
2. Article 285.6, TVSS shall be marked with a short circuit current rating and shall not be installed at a point on the system (ex. service, distribution or branch panels) where the available fault current (AIC rating) is in excess of that rating.

D. UL 1449 stipulation for fused SPD - The manufacturer's authorized representative is required to submit the following:

1. Certify that the SPD is UL 1449 3rd edition listed (UL Card) with UL Card.
2. Indicate the type of internal or external fusing that is incorporated in the SPD and what impact the fusing has on the performance of the device with respect to surge capacity and clamping levels.

1.3 STANDARDS

A. Underwriters Laboratories 1449 - (UL 1449 3rd Edition)
Include Electromagnetic interference filter which provides noise attenuation.

B. National Electrical Code 2008 rev. - (NEC Article 285 SPD installation practice/NEC article 250.56 grounding)
NFPA-78 and CSA - (National Fire Protection Association and Canadian Standards Associations)
ISO 9001:2000 - quality standard
Military standards (mil-std 220B)

C. IEEE (Institute of Electrical and Electronic Engineering Inc.) C62.41.1 and c62.41.2 – 2002 rev. - (system shall be designed to meet c62.41)

1. IEEE C62.41.2-2002 section 7.2 long duration 10 x 1,000 • sec test to be compliant if the device exhibits less than 10% deviation from initial readings. Units must be tested to withstand and pass the 10 x 1,000 • sec test
2. IEEE C62.45 – 2002 rev. - (system shall be tested to meet the C62.45)
3. Category A & B - (0.5 • s x 100 kHz ring wave)
4. Category B3 bi-wave - (8 x 20 • s at 3,000 amperes and 1.2 x 50 • s at 6,000 volts)
5. Category C3 bi-wave - (8 x 20 • s at 10,000 amperes and 1.2 x 50 • s at 20,000 volts)

D. IEEE Std. 1100 (2005) “The Emerald Book” Section 8.4.2.5

E. The fusing elements must be capable of allowing the suppressor’s rated single impulse current to pass through the suppressor at least one time without failure. The system shall be tested to 1,000 sequential per C62.45-2002 section b.38 referencing C62.41.1 and C62.41.2 category c3 combination wave transients. The category c3 combination wave is defined as a 1.2 x 50 microsecond wave at 20,000 volt open circuit voltage waveform and 8 x 20 microsecond wave at 10,000 ampere short circuit current waveform. In addition, the system components shall be tested repetitively 1,000 times testing based on an IEEE c62.33 (MOV test) and c62.35 (sad test) without failure or degradation exceeding ±10%.

F. CBEMA (ITIC) and IEC - (Computer Business Equipment Manufacturers Association or Information Technology Industry Council and International Electrotechnical Commission define clamping voltage tolerance guidelines for sensitive equipment).

G. UL 1449 3rd Edition Voltage Protection Rating (VPR) is assigned to each mode of protection using a combination wave generator at a setting of 6kV, 3kA. SPD shall have a Nominal Discharge Current rating (I_n) of 10kA or 20kA.

H. All manufacturers must comply with above listed standards and any additions current revisions of industry standards. All products that do not comply with current industry standards will not be accepted.

1.4 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of surge suppressors that fails in materials or workmanship within specified warranty period.

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

1.5 RECEIVING, STORING AND PROTECTING

A. Receive, store, protect, and handle products according to NECA 1 *Standard Practices for Good Workmanship in Electrical Construction*.

PART 2 - PRODUCTS

2.1 BRANCH PANEL SUPPRESSORS

A. Acceptable Manufacturers and Models:

1. Current Technology – CGP060
2. LEA International Inc. –SP100
3. Liebert – ACV-111-RKE

No other Manufacturers will be accepted.

B. Device shall meet all specification requirements in section 2.1 except as follows:

1. Equipment shall be a multi-stage parallel protector. Provide voltage configuration as required per contract documents. The equipment's minimum surge current capacity shall be 100kA per phase (L-N plus L-G) and 50kA per mode (L-N, L-G, L-L and N-G).
2. The system protection shall contain a technology that utilizes a symmetrical array of balanced metal oxide varistors (MOV). Each MOV will be individually coordinated to pass UL 1449. The unit shall be non-modular type.
3. Equipment shall provide the following monitoring features: dry contacts and audible alarm with alarm disable switch. Equipment shall utilize a NEMA 4X enclosure.

2.2 ENCLOSURES

A. Indoor Enclosures: NEMA 250 Type 12.

B. Outdoor Enclosures: NEMA 250 Type 4X.

2.3 SURGE PROTECTIVE DEVICES FOR SIGNAL, DATA, AND CONTROL LINES

A. Provide surge protective devices suitable for the protection of signal, data, antenna, and control lines.

1. Select surge protective devices with consideration for aspects such as the frequency, bandwidth, voltage, and current of the signal, data, antenna, or other communications lines and to ensure that insertion losses introduced by the surge protective devices are within acceptable operational limits.
2. Coordinate selection of surge protective devices for signal, data, antenna, and control lines with owner of equipment that is served by the lines.

B. Provide surge protective devices for of signal, data, and control lines that provide both common mode and differential mode protection.

C. Provide surge protective devices for signal, data, control, and alarm lines.

1. Devices shall be listed in accordance with UL 497B Standard for Safety Protectors for Data Communications and Fire Alarm Circuits.
2. Provide devices with ratings and connectors as required by the application.
3. Manufacturer: Transtector Systems, EDCO, MCG Electronics

D. Provide coaxial surge protective devices for antenna and RF signal lines.

1. Devices shall be listed in accordance with UL 497C Standard for Safety Protectors for Coaxial Communications Circuits.
2. Provide devices with ratings and connectors as required by the application.
3. Provide bulkhead plates and low-impedance paths to ground where antenna cables enter the structure.
4. Manufacturers: TII Network Technologies, Inc, Cable Innovations, PolyPhaser.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify mounting area is ready for equipment. Allow adequate clearances for maintenance.

B. Verify that circuit rough-in is at correct location.

3.2 INSTALLATION

A. Install surge protective devices externally mounted to the service entrance, distribution and branch panelboards, as stand-alone units. Internal products will not be accepted.

B. Install surge protective devices where indicated on the Drawings and according to manufacturer's instructions and the *National Electrical Code*. SPD shall be installed with the shortest lead length possible not to exceed five (5') feet for service entrance and distribution and one foot and half (1.5') for branch panelboards from the power conductor(s) it is protecting. Have the manufacturer's installation instructions available at the construction site.

C. Install surge protective device in the service equipment to protect each ungrounded conductor on the line side of the service entrance disconnecting means.

D. Install surge protective device to protect each ungrounded conductor of power circuits that exits the structure to serve external detached equipment or other detached structures. Where such power circuits are longer than 100 ft install surge protective devices to protect each ungrounded conductor at both ends of the circuit.

E. Install UL 497B listed surge protective device for each for signal, data, control, and alarm line that enters the structure or exits the structure to serve external detached equipment or other detached structures. Where such signal, data, control, and alarm circuits are longer than 100 ft install UL 497B listed surge protective device at both ends of the circuit.

F. Install each surge protective device so it will be accessible for inspection and maintenance and so the condition monitoring indicator will be visible without requiring the removal of cover plates.

G. Install each surge protective device with minimum possible conductor length and a maximum conductor length of 18 inches.

1. Twist conductors tightly together and keep runs as straight as possible with no sharp bends or kinks.
2. Use approved means to make connections from the surge protective device to conductors to be protected.

H. Provide low-impedance grounding for surge protective devices.

1. Use approved means to make connections from the surge protective device to the point where the electrical power system grounded conductor is bonded to the grounding electrode conductor.
2. If the surge protective device is more than 20 ft away from the electrical system bonding point, make one or more supplementary grounding electrode connections at the surge protective device location. Use the building “main grounding electrode ground bar”, “main grounding electrode ground bar extensions”, effectively grounded building structural steel, and grounded water pipes as supplementary grounding electrodes.
3. Do not use a lightning protection system down conductor to ground a surge protective device.

3.3 Field Quality Control

A. Provide final protection and maintain conditions to ensure that coatings and finishes are without damage or deterioration at final inspection.

B. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.

C. Repair damage to paint finishes with matching touch-up coating recommended by the manufacturer.

D. Verify that each surge protective device is correctly connected and that all condition monitoring indicators operate properly.

3.4 STARTUP SERVICE

A. Do not energize or connect service entrance equipment and panelboards to their sources until SPD are installed and connected.

B. Do not perform insulation resistance tests of the distribution wiring equipment with the SPD installed. Disconnect before conducting insulation resistance tests, and reconnect immediately after the testing is over.

END OF SECTION 26 43 13

SECTION 26 28 16
ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fusible switches.
2. Nonfusible switches.
3. Shunt trip switches.
4. Molded-case circuit breakers (MCCBs).
5. Enclosures.

1.2 DEFINITIONS

A. NC: Normally closed.

B. NO: Normally open.

C. SPDT: Single pole, double throw.

1.3 SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated.

B. Shop Drawings: For enclosed switches and circuit breakers. Include plans, elevations, sections, details, and attachments to other work.

1. Wiring Diagrams: For power, signal, and control wiring.

C. Field quality-control reports.

D. Operation and maintenance data.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 FUSIBLE SWITCHES

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

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. Siemens Energy & Automation, Inc.
3. Square D; a brand of Schneider Electric.

B. Type HD, Heavy Duty, Single Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate indicated fuses, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

C. Type HD, Heavy Duty, Six Pole, Single Throw, 600-V ac, 200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate indicated fuses, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

D. Type HD, Heavy Duty, Double Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate indicated fuses, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

E. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
4. Lugs: Suitable for number, size, and conductor material.
5. Service-Rated Switches: Labeled for use as service equipment.

2.2 NONFUSIBLE SWITCHES

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

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. Siemens Energy & Automation, Inc.
3. Square D; a brand of Schneider Electric.

B. Type HD, Heavy Duty, Single Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

C. Type HD, Heavy Duty, Six Pole, Single Throw, 600-V ac, 200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

D. Type HD, Heavy Duty, Double Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

E. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Lugs: Suitable for number, size, and conductor material.

2.3 SHUNT TRIP SWITCHES

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

1. Cooper Bussmann, Inc.
2. Ferraz Shawmut, Inc.
3. Littelfuse, Inc.

B. General Requirements: Comply with ASME A17.1, UL 50, and UL 98, with 200-kA interrupting and short-circuit current rating when fitted with Class J fuses.

C. Switches: Three-pole, horsepower rated, with integral shunt trip mechanism and Class J fuse block; lockable handle with capability to accept three padlocks; interlocked with cover in closed position.

D. Control Circuit: 120-V ac; obtained from integral control power transformer, with primary and secondary fuses, with a control power source of enough capacity to operate shunt trip, connected pilot, and indicating and control devices.

E. Accessories:

1. Oiltight key switch for key-to-test function.
2. Oiltight ON pilot light.
3. Isolated neutral lug.
4. Mechanically interlocked auxiliary contacts that change state when switch is opened and closed.
5. Form C alarm contacts that change state when switch is tripped.
6. Three-pole, double-throw, fire-safety and alarm relay; 120-V ac coil voltage.
7. Three-pole, double-throw, fire-alarm voltage monitoring relay complying with NFPA 72.

2.4 MOLDED-CASE CIRCUIT BREAKERS

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

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. Siemens Energy & Automation, Inc.
3. Square D; a brand of Schneider Electric.

B. General Requirements: Comply with UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents.

C. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

D. Electronic Trip Circuit Breakers: Field-replaceable rating plug, rms sensing, with the following field-adjustable settings:

1. Instantaneous trip.
2. Long- and short-time pickup levels.
3. Long- and short-time time adjustments.
4. Ground-fault pickup level, time delay, and I^2t response.

E. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller, and let-through ratings less than NEMA FU 1, RK-5.

F. Features and Accessories:

1. Standard frame sizes, trip ratings, and number of poles.
2. Lugs: Suitable for number, size, trip ratings, and conductor material.
3. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge lighting circuits.
4. Ground-Fault Protection: Comply with UL 1053; integrally mounted, self-powered type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero-sequence current transformer/sensor.
5. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.
6. Auxiliary Contacts: Two SPDT switches with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts, "b" contacts operate in reverse of circuit-breaker contacts.
7. Alarm Switch: One NC contact that operates only when circuit breaker has tripped.

2.5 ENCLOSURES

A. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.

1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
2. Outdoor Locations: NEMA 250, Type 3R.
3. Wash-Down Areas: NEMA 250,, stainless steel.
4. Other Wet or Damp, Indoor Locations: NEMA 250, Type 4.
5. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.

B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

C. Install fuses in fusible devices.

D. Comply with NECA 1.

3.2 IDENTIFICATION

A. Comply with requirements in Division 26 Section "Identification for Electrical Systems."

1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Acceptance Testing Preparation:

1. Test insulation resistance for each enclosed switch and circuit breaker, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

C. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

D. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports, including a certified report that identifies enclosed switches and circuit breakers and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

END OF SECTION 26 28 16

SECTION 26 28 13
FUSES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Cartridge fuses rated 600-V ac and less for use in control circuits, enclosed switches, panelboards, switchboards, enclosed controllers and motor-control centers.

1.2 SUBMITTALS

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

B. Operation and maintenance data.

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NEMA FU 1 for cartridge fuses.

C. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Cooper Bussmann, Inc.
2. Edison Fuse, Inc.
3. Ferraz Shawmut, Inc.
4. Littelfuse, Inc.

2.2 CARTRIDGE FUSES

A. Characteristics: NEMA FU 1, nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages.

PART 3 - EXECUTION

3.1 FUSE APPLICATIONS

A. Service Entrance: Class L, time delay.

B. Feeders: Class J, time delay.

C. Motor Branch Circuits: Class RK5, time delay.

D. Other Branch Circuits: Class J, fast acting.

E. Control Circuits: Class CC, fast acting.

3.2 INSTALLATION

A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.

3.3 IDENTIFICATION

A. Install labels complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems" and indicating fuse replacement information on inside door of each fused switch and adjacent to each fuse block and holder.

END OF SECTION 26 28 13

SECTION 26 09 23
LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Time switches.
2. Photoelectric switches.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data

PART 2 - PRODUCTS

2.1 TIME SWITCHES

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Cooper Industries, Inc.
2. Intermatic, Inc.
3. Leviton Mfg. Company Inc.

B. Electronic Time Switches: Solid state, programmable, with alphanumeric display; complying with UL 917.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Contact Configuration: SPST.
3. Contact Rating: 20-A ballast load, 120-/240-V ac.
4. Programs: Eight on-off set points on a 24-hour schedule and an annual holiday schedule that overrides the weekly operation on holidays.
5. Circuitry: Allow connection of a photoelectric relay as substitute for on-off function of a program.

6. Astronomic Time: All channels.
7. Automatic daylight savings time changeover.
8. Battery Backup: Not less than seven days reserve, to maintain schedules and time clock.

C. Electromechanical-Dial Time Switches: Comply with UL 917.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Contact Configuration: SPST.
3. Contact Rating: 20-A ballast load, 120-/240-V ac.
4. Circuitry: Allows connection of a photoelectric relay as a substitute for the on-off function of a program.
5. Astronomic time dial.
6. Eight-Day Program: Uniquely programmable for each weekday and holidays.
7. Skip-a-day mode.

2.2 OUTDOOR PHOTOELECTRIC SWITCHES

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Cooper Industries, Inc.
2. Intermatic, Inc.
3. Tyco Electronics; ALR Brand.

B. Description: Solid state, with SPST dry contacts rated for 1800 VA, to operate connected load, complying with UL 773.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Light-Level Monitoring Range: 1.5 to 10 fc, with an adjustment for turn-on and turn-off levels within that range.
3. Time Delay: Thirty-second minimum, to prevent false operation.
4. Lightning Arrester: Air-gap type.
5. Mounting: Twist lock complying with NEMA C136.10, with base.

2.3 LIGHTING CONTACTORS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Allen-Bradley/Rockwell Automation.
2. ASCO Power Technologies, LP; a division of Emerson Electric Co.
3. Eaton Corporation.
4. Square D; a brand of Schneider Electric.

B. Description: Electrically operated and mechanically held, combination-type lighting contactors with fusible switch, complying with NEMA ICS 2 and UL 508.

1. Current Rating for Switching: Listing or rating consistent with type of load served, including tungsten filament, inductive, and high-inrush ballast (ballast with 15 percent or less total harmonic distortion of normal load current).

2. Fault Current Withstand Rating: Equal to or exceeding the available fault current at the point of installation.
3. Enclosure: Comply with NEMA 250.
4. Provide with control and pilot devices as indicated on Drawings, matching the NEMA type specified for the enclosure.

2.4 CONDUCTORS AND CABLES

A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements.

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Operational Test: After installing time switches and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Lighting control devices will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION 26 09 23

SECTION 26 05 53
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Identification for raceways.
2. Identification of power and control cables.
3. Identification for conductors.
4. Underground-line warning tape.
5. Warning labels and signs.
6. Instruction signs.
7. Equipment identification labels.
8. Miscellaneous identification products.

1.2 SUBMITTALS

A. Product Data: For each electrical identification product indicated.

1.3 QUALITY ASSURANCE

A. Comply with ANSI A13.1.

B. Comply with NFPA 70.

C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

D. Comply with ANSI Z535.4 for safety signs and labels.

E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

PART 2 - PRODUCTS

2.1 POWER RACEWAY IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.

B. Colors for Raceways Carrying Circuits at 600 V or Less:

1. Black letters on an orange field.
2. Legend: Indicate voltage.

C. Self-Adhesive Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

D. Snap-Around Labels for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

E. Snap-Around, Color-Coding Bands for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

F. Specify thicker tags in paragraph below where exposed to damage or to rough service.

G. Write-On Tags: Polyester tag, 0.015 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.

H. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
1. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

2.2 ARMORED AND METAL-CLAD CABLE IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.

B. Colors for Raceways Carrying Circuits at 600 V and Less:

1. Black letters on an orange field.
2. Legend: Indicate voltage.

C. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

D. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; 2 inches wide; compounded for outdoor use.

2.3 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.

B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

C. Write-On Tags: Polyester tag, 0.010 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.

1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.

2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

D. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

E. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

F. CONDUCTOR IDENTIFICATION MATERIALS

G. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.

H. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

I. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

J. Write-On Tags: Polyester tag, 0.010 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.

1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

2.4 FLOOR MARKING TAPE

1. 2-inch- wide, 5-mil pressure-sensitive vinyl tape, with black and white stripes and clear vinyl overlay.

2.5 UNDERGROUND-LINE WARNING TAPE

A. Tape:

1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
2. Printing on tape shall be permanent and shall not be damaged by burial operations.
3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.

B. Color and Printing:

1. Comply with ANSI Z535.1 through ANSI Z535.5.
2. Inscriptions for Red-Colored Tapes: ELECTRIC LINE, HIGH VOLTAGE.
3. Inscriptions for Orange-Colored Tapes: TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE.

C. Tag: Type I:

1. Pigmented polyolefin, bright-colored,compounded for direct-burial service.
2. Thickness: 4 mils.
3. Weight: 18.5 lb/1000 sq. ft..
4. 3-Inch Tensile According to ASTM D 882: 30 lbf, and 2500 psi.

D. Tag: Type ID:

1. Detectable three-layer laminate, consisting of a printed pigmented polyolefin film, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core, bright-colored,compounded for direct-burial service.
2. Overall Thickness: 5 mils.
3. Foil Core Thickness: 0.35 mil.
4. Weight: 28 lb/1000 sq. ft..
5. 3-Inch Tensile According to ASTM D 882: 70 lbf, and 4600 psi.

2.6 WARNING LABELS AND SIGNS

A. Comply with NFPA 70 and 29 CFR 1910.145.

B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.

C. Baked-Enamel Warning Signs:

1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
2. 1/4-inch grommets in corners for mounting.
3. Nominal size, 7 by 10 inches.

D. Metal-Backed, Butyrate Warning Signs:

1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch galvanized-steel backing; and with colors, legend, and size required for application.
2. 1/4-inch grommets in corners for mounting.
3. Nominal size, 10 by 14 inches.

E. Warning label and sign shall include, but are not limited to, the following legends:

1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."

2.7 INSTRUCTION SIGNS

A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch thick for signs up to 20 sq. inches and 1/8 inch thick for larger sizes.

1. Engraved legend with black letters on white face.
2. Punched or drilled for mechanical fasteners.
3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

B. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch.

C. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch. Overlay shall provide a weatherproof and UV-resistant seal for label.

2.8 EQUIPMENT IDENTIFICATION LABELS

A. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch. Overlay shall provide a weatherproof and UV-resistant seal for label.

B. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch.

C. Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height shall be 1 inch.

2.9 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in Division 09 painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

B. Apply identification devices to surfaces that require finish after completing finish work.

C. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.

D. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.

E. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.

F. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches overall.

G. Painted Identification: Comply with requirements in Division 09 painting Sections for surface preparation and paint application.

3.2 IDENTIFICATION SCHEDULE

A. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits More Than 30 A, and 120 V to ground: Install labels at 10-foot maximum intervals.

B. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage. System legends shall be as follows:
1. Power.

C. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.

1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded service, feeder, and branch-circuit conductors.

a. Color shall be factory applied.
b. Colors for 208/120-V Circuits:

1) Phase A: Black.
2) Phase B: Red.
3) Phase C: Blue.

c. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

D. Install instructional sign including the color-code for grounded and ungrounded conductors using adhesive-film-type labels.

E. Conductors to Be Extended in the Future: Attach write-on tags to conductors and list source.

F. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.

1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.

G. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.
   1. Install underground-line warning tape for both direct-buried cables and cables in raceway.

H. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.

I. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Metal-backed, butyrate warning signs.

   1. Comply with 29 CFR 1910.145.
   2. Identify system voltage with black letters on an orange background.
   3. Apply to exterior of door, cover, or other access.
   4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:

      a. Power transfer switches.
      b. Controls with external control power connections.

J. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.

K. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch- high letters for emergency instructions at equipment used for power transfer.

L. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.

   1. Labeling Instructions:

      a. Outdoor Equipment: Engraved, laminated acrylic or melamine label Stenciled legend 4 inches high.
      b. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
      c. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.

END OF SECTION 26 05 53

SECTION 26 05 33
RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

1.2 SUBMITTALS

A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, details, and attachments to other work.

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 METAL CONDUIT AND TUBING

A. Rigid Steel Conduit: ANSI C80.1.

B. IMC: ANSI C80.6.

C. EMT: ANSI C80.3.

D. FMC: Zinc-coated steel.

E. LFMC: Flexible steel conduit with PVC jacket.

F. Fittings for Conduit (Including all Types and Flexible and Liquidtight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.

1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886.
2. Fittings for EMT: Steel or die-cast, set-screw or compression type.

2.2 NONMETALLIC CONDUIT AND TUBING

A. ENT: NEMA TC 13.

B. RNC: NEMA TC 2, Type EPC-40-PVC, unless otherwise indicated.

C. LFNC: UL 1660.

D. Fittings for ENT and RNC: NEMA TC 3; match to conduit or tubing type and material.

E. Fittings for LFNC: UL 514B.

2.3 METAL WIREWAYS

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

1. Cooper B-Line, Inc.
2. Hoffman.
3. Square D; Schneider Electric.

B. Description: Sheet metal sized and shaped as indicated, NEMA 250, Type 3R, unless otherwise indicated.

C. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

D. Wireway Covers: Flanged-and-gasketed type.

E. Finish: Manufacturer's standard enamel finish.

2.4 NONMETALLIC WIREWAYS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Hoffman.
2. Lamson & Sessions; Carlon Electrical Products.

B. Description: PVC plastic, extruded and fabricated to size and shape indicated, with snap-on cover and mechanically coupled connections with plastic fasteners.

C. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

2.5 SURFACE RACEWAYS

A. Surface Metal Raceways: Galvanized steel with snap-on covers. Manufacturer's standard enamel finish in color selected by Architect.

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

    a. Thomas & Betts Corporation.
    b. Walker Systems, Inc.; Wiremold Company (The).
    c. Wiremold Company (The); Electrical Sales Division.

B. Surface Nonmetallic Raceways: Two-piece construction, manufactured of rigid PVC with texture and color selected by Architect from manufacturer's standard colors.

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

    a. Butler Manufacturing Company; Walker Division.
    b. Enduro Systems, Inc.; Composite Products Division.
    c. Hubbell Incorporated; Wiring Device-Kellems Division.
    d. Lamson & Sessions; Carlon Electrical Products.
    e. Panduit Corp.
    f. Walker Systems, Inc.; Wiremold Company (The).
    g. Wiremold Company (The); Electrical Sales Division.

2.6 BOXES, ENCLOSURES, AND CABINETS

A. Sheet Metal Outlet and Device Boxes: NEMA OS 1.

B. Cast-Metal Outlet and Device Boxes: NEMA FB 1, aluminum, Type FD, with gasketed cover.

C. Nonmetallic Outlet and Device Boxes: NEMA OS 2.

D. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

E. Cast-Metal Access, Pull, and Junction Boxes: NEMA FB 1, cast aluminum with gasketed cover.

F. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous-hinge cover with flush latch, unless otherwise indicated.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
2. Nonmetallic Enclosures: Plastic, finished inside with radio-frequency-resistant paint.

G. Cabinets:

1. NEMA 250, Type 1, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
2. Hinged door in front cover with flush latch and concealed hinge.
3. Key latch to match panelboards.
4. Metal barriers to separate wiring of different systems and voltage.
5. Accessory feet where required for freestanding equipment.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below, unless otherwise indicated:

1. Exposed Conduit: Rigid steel conduit.
2. Concealed Conduit, Aboveground: Rigid steel conduit.
3. Underground Conduit: RNC, Type EPC-40-PVC, direct buried.
4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.

B. Comply with the following indoor applications, unless otherwise indicated:

1. Exposed, Not Subject to Physical Damage: EMT.
2. Exposed, Not Subject to Severe Physical Damage: EMT.
3. Exposed and Subject to Severe Physical Damage: Rigid steel conduit. Includes raceways in the following locations:

    a. Loading dock.
    b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
    c. Mechanical rooms.

4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
6. Damp or Wet Locations: Rigid steel conduit or IMC.
7. Raceways for Optical Fiber or Communications Cable: EMT.
8. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4, stainless steel in damp or wet locations.

C. Minimum Raceway Size: 3/4-inch trade size.

D. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.

3.2 INSTALLATION

A. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter.

B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

C. Complete raceway installation before starting conductor installation.

D. Support raceways as specified in Division 26 Section "Hangers and Supports for Electrical Systems."

E. Arrange stub-ups so curved portions of bends are not visible above the finished slab.

F. Install no more than the equivalent of three 90-degree bends in any conduit run except for communications conduits, for which fewer bends are allowed.

G. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.

H. Raceways Embedded in Slabs:

1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
3. Change from ENT to RNC, Type EPC-40-PVC, rigid steel conduit, or IMC before rising above the floor.

I. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors, including conductors smaller than No. 4 AWG.

J. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire.

K. Raceways for Optical Fiber and Communications Cable: Install as follows:

1. 3/4-Inch Trade Size and Smaller: Install raceways in maximum lengths of 50 feet.
2. 1-Inch Trade Size and Larger: Install raceways in maximum lengths of 75 feet.
3. Install with a maximum of two 90-degree bends or equivalent for each length of raceway unless Drawings show stricter requirements. Separate lengths with pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements.

L. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where otherwise required by NFPA 70.

M. Expansion-Joint Fittings for RNC: Install in each run of aboveground conduit that is located where environmental temperature change may exceed 30 deg F, and that has straight-run length that exceeds 25 feet.

1. Install expansion-joint fittings for each of the following locations, and provide type and quantity of fittings that accommodate temperature change listed for location:

a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.
c. Indoor Spaces: Connected with the Outdoors without Physical Separation: 125 deg F temperature change.
d. Attics: 135 deg F temperature change.

2. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change.
3. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at the time of installation.

N. Flexible Conduit Connections: Use maximum of 72 inches of flexible conduit for recessed and semirecessed lighting fixtures, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

1. Use LFMC in damp or wet locations subject to severe physical damage.
2. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.

O. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified for pipe less than 6 inches in nominal diameter.
2. Install backfill as specified .
3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Division 30.
4. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through the floor, unless otherwise indicated. Encase elbows for stub-up ducts throughout the length of the elbow.
5. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through the floor.

    a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete.
    b. For stub-ups at equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of 60 inches from edge of equipment pad or foundation. Install insulated grounding bushings on terminations at equipment.

6. Warning Tape: Bury warning tape approximately 12 inches above direct-buried conduits. Align tape along the width and along the centerline of conduit.

END OF SECTION 26 05 33

SECTION 26 05 26
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Grounding systems and equipment.

1.2 SUBMITTALS

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

B. Field quality-control reports.

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 CONDUCTORS

A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

B. Bare Copper Conductors:

1. Solid Conductors: ASTM B 3.
2. Stranded Conductors: ASTM B 8.
3. Tinned Conductors: ASTM B 33.
4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

2.2 CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, pressure type with at least two bolts.

1. Pipe Connectors: Clamp type, sized for pipe.

C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

2.3 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel, sectional type; 3/4 inch by 10 feet in diameter.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.

B. Underground Grounding Conductors: Install bare tinned-copper conductor, No. 2/0 AWG minimum. Bury at least 24 inches below grade.

C. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
3. Connections to Ground Rods at Test Wells: Bolted connectors.
4. Connections to Structural Steel: Welded connectors.

3.2 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:

1. Feeders and branch circuits.
2. Lighting circuits.

3.3 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.

1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.

C. Test Wells: Ground rod driven through drilled hole in bottom of handhole. Handholes are specified in Division 26 and shall be at least 12 inches deep, with cover.

1. Test Wells: Install at least one test well for each service unless otherwise indicated. Install at the ground rod electrically closest to service entrance. Set top of test well flush with finished grade or floor.

D. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.

1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.

3.4 LABELING

A. Comply with requirements in Division 26 Section "Identification for Electrical Systems" Article for instruction signs. The label or its text shall be green.

B. Install labels at the telecommunications bonding conductor and grounding equalizer and at the grounding electrode conductor where exposed.

1. Label Text: "If this connector or cable is loose or if it must be removed for any reason, notify the facility manager."

3.5 FIELD QUALITY CONTROL

A. Perform the following tests and inspections and prepare test reports:

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at ground test wells. Make tests at ground rods before any conductors are connected.

B. Report measured ground resistances that exceed the following values:

1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.
2. Power and Lighting Equipment or System with Capacity of 500 to 1000 kVA: 5 ohms.
3. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 ohms.

4. Power Distribution Units or Panelboards Serving Electronic Equipment: 1 ohm(s).

C. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 26 05 26

SECTION 26 05 00
COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 The electrical work included in all other divisions are the responsibility of the contractor performing the Division 26 work unless noted otherwise.

1.2 PROJECT OVERVIEW

A. Provide power, lighting and special systems for the construction of site lighting for a parking lot for a county transit system.

1.3 SCOPE

A. The work under this section includes basic electrical requirements, which are applicable to all Division 26 sections. This section includes information common to two or more technical specification sections or items that are of a general nature, not conveniently fitting into other technical sections. Included are the following topics:

B. Section Includes:

1. GENERAL

a. Project Overview
b. Scope
c. Related Work
d. Reference Standards
e. Regulatory Requirements
f. Quality Assurance
g. Continuity of Existing Services and Systems
h. Protection of Finished Surfaces
i. Approved Electrical Testing Laboratories
j. Sleeves for Raceways and Cables
k. Sleeve Seals
l. Grout
m. Sealing and Firestopping
n. Owner Furnished Equipment
o. Work by Owner
p. Provisions for Future Work
q. Intent
r. Omissions
s. Submittals
t. Salvage Materials
u. Certificates and Inspections
v. Operating and Maintenance Data
w. Training of Owner Personnel
x. Record Drawings

2. PRODUCTS

a. Identification

3. EXECUTION

   a. Excavation and Backfill
   b. Concrete Work
   c. Cutting and Patching
   d. Building Access
   e. Coordination
   f. Housekeeping and Clean Up

4. RELATED WORK

   a. Applicable provisions of Division 01 govern work under this Section.

5. REFERENCE STANDARDS

   a. Abbreviations of standards organizations referenced in this and other sections are as follows:

      1) ANSI American National Standards Institute
      2) ASTM American Society for Testing and Materials
      3) EPA Environmental Protection Agency
      4) ETL Electrical Testing Laboratories, Inc.
      5) IEEE Institute of Electrical and Electronics Engineers
      6) IES Illuminating Engineering Society
      7) ISA Instrument Society of America
      8) NBS National Bureau of Standards
      9) NEC National Electric Code
      10) NEMA National Electrical Manufacturers Association
      11) NESC National Electrical Safety Code
      12) NFPA National Fire Protection Association
      13) UL Underwriters Laboratories Inc.

6. REGULATORY REQUIREMENTS

   a. All work and materials are to conform in every detail to applicable rules and requirements of the National Electrical Code (ANSI/NFPA 70), other applicable National Fire Protection Association codes, the National Electrical Safety Code, and present manufacturing standards (including NEMA).
   b. All Division 26 work shall be done under the direction of a currently certified State of Florida Certified Master Electrician.

7. QUALITY ASSURANCE

   a. Where equipment or accessories are used which differ in arrangement, configuration, dimensions, ratings, or engineering parameters from those indicated on the contract documents, the contractor is responsible for all costs involved in integrating the equipment or accessories into the system and the assigned space and for obtaining the performance from the system into which these items are placed.
   b. Manufacturer references used herein are intended to establish a level of quality and performance requirements unless more explicit restrictions are stated to apply.
   c. All materials, except medium voltage equipment and components, shall be listed by and shall bear the label of an approved electrical testing laboratory. If none of the approved electrical testing laboratories has published standards for a particular

item, then other national independent testing standards, if available, applicable, and approved by DSF, shall apply and such items shall bear those labels. Where one of the approved electrical testing laboratories has an applicable system listing and label, the entire system, except for medium voltage equipment and components, shall be so labeled.

8. CONTINUITY OF EXISTING SERVICES AND SYSTEMS

a. No outages shall be permitted on existing systems except at the time and during the interval specified by the Owner and Architect. This will require written approval. Any outage must be scheduled when the interruption causes the least interference with normal institutional schedules and business routines. No extra costs will be paid to the Contractor for such outages which must occur outside of regular weekly working hours. If required by the serving utility, include these costs in bid.

b. This Contractor shall restore any circuit interrupted as a result of this work to proper operation as soon as possible.

9. PROTECTION OF FINISHED SURFACES

a. Furnish one can of touch-up paint for each different color factory finish furnished by the Contractor. Deliver touch-up paint with other "loose and detachable parts" as covered in the General Requirements.

10. APPROVED ELECTRICAL TESTING LABORATORIES

a. The following laboratories are approved for providing electrical product safety testing and listing services as required in these specifications:

1) Underwriters Laboratories Inc.
2) Electrical Testing Laboratories, Inc.

1.4 SLEEVES FOR RACEWAYS AND CABLES

A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.

B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

C. Sleeves for Rectangular Openings: Galvanized sheet steel.

1. Minimum Metal Thickness:

a. For sleeve cross-section rectangle perimeter less than 50 inches and no side more than 16 inches, thickness shall be 0.052 inch.

b. For sleeve cross-section rectangle perimeter equal to, or more than, 50 inches and 1 or more sides equal to, or more than, 16 inches, thickness shall be 0.138 inch.

1.5 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

1.6 WORK BY OWNER

A. Asbestos abatement and PCB equipment (other than light fixture ballasts) removal and disposal, if required, will be by the Owner under separate contract.

B. Electrical testing not described in these contract documents will be by the Owner under separate contract.

1.7 INTENT

A. The Contractor shall furnish and install all the necessary materials, apparatus, and devices to complete the electrical equipment and systems installation herein specified, except such parts as are specifically exempted herein.

B. If an item is either called for in the specifications or shown on the plans, it shall be considered sufficient for the inclusion of said item in this contract. If a conflict exists within the Specifications or exists within the Drawings, the Contractor shall furnish the item, system, or workmanship, which is the highest quality, largest, or most closely fits the Owners intent). Refer to the General Conditions of the Contract for further clarification.

C. It must be understood that the details and drawings are diagrammatic. The Contractor shall verify all dimensions at the site and be responsible for their accuracy.

D. All sizes as given are minimum except as noted.

E. Materials and labor shall be new (unless noted or stated otherwise), first class, and workmanlike, and shall be subject at all times to the Owner's and Architect's inspections, tests and approval from the commencement until the acceptance of the completed work.

F. Whenever a particular manufacturer's product is named, it is intended to establish a level of quality and performance requirements unless more explicit restrictions are stated to apply.

1.8 OMISSIONS

A. No later than ten (10) days before bid opening, the Contractor shall call the attention of the Owner and Architect to any materials or apparatus the Contractor believes to be inadequate and to any necessary items of work omitted.

1.9 SUBMITTALS

A. Submit for all equipment and systems as indicated in the respective specification sections, marking each submittal with that specification section number. Mark general catalog sheets and drawings to indicate specific items being submitted and proper identification of equipment by name and/or number, as indicated in the contract documents. Failure to do this may result

in the submittal(s) being returned to the Contractor for correction and resubmission. Failing to follow these instructions does not relieve the Contractor from the requirement of meeting the project schedule.

B. On request from the Architect, the successful bidder shall furnish additional drawings, illustrations, catalog data, performance characteristics, etc.

C. Submittals shall be grouped to include complete submittals of related systems, products, and accessories in a single submittal. Mark dimensions and values in units to match those specified. Include wiring diagrams of electrically powered equipment.

D. The submittals must be approved before fabrication is authorized.

E. Submit sufficient quantities of submittals to allow the following distribution:

1.	Operating and Maintenance Manuals	3 copies
2.	Architect	2 copies
3.	Engineer	1 copy

1.10 PROJECT/SITE CONDITIONS

A. Install Work in locations shown on Drawings, unless prevented by Project conditions.

B. Prepare drawings showing proposed rearrangement of Work to meet Project conditions, including changes to Work specified in other Sections. Obtain permission of Owner and Architect before proceeding.

C. Tools, materials and equipment shall be confined to areas designated by the Owner and Architect.

1.11 ASBESTOS ABATEMENT

A. The Owner is responsible for identifying Asbestos Containing Materials (ACMs) in State buildings. Contractor shall not supply or install any materials that contain any amount of asbestos.

1.12 WORK SEQUENCE AND SCHEDULING

A. Install work in phases to accommodate user Owner's occupancy requirements. During the construction period coordinate electrical schedule and operations with the Owner and Architect.

1.13 WORK BY OTHER TRADES

A. Every attempt has been made to indicate in this trade's specifications and drawings all work required of this Contractor. However, there may be additional specific paragraphs in other trade specifications and addenda, and additional notes on drawings for other trades which pertain to this Trade's work, and thus those additional requirements are hereby made a part of these specifications and drawings.

B. Electrical details on drawings for equipment to be provided by others are based on preliminary design data only. This Contractor shall lay out the electrical work and shall be responsible for its correctness to match equipment actually provided by others.

1.14 SALVAGE MATERIALS

A. No materials removed from this project shall be reused. All materials removed shall become the property of and shall be disposed of by the Contractor.

1.15 CERTIFICATES AND INSPECTIONS

A. Obtain and pay for all required installation inspections.

1.16 OPERATION AND MAINTENANCE DATA

A. Assemble material in three-ring or post binders, using an index at the front of each volume and tabs for each system or type of equipment. In addition to the data indicated in the General Requirements, include the following information:

1. Copies of all approved submittals.
2. Manufacturer's wiring diagrams for electrically powered equipment.
3. Records of tests performed to certify compliance with system requirements.
4. Certificates of inspection by regulatory agencies.
5. Parts lists for manufactured equipment.
6. Preventative maintenance recommendations.
7. Warranties.
8. Additional information as indicated in the technical specification sections.

1.17 RECORD DRAWINGS

A. The Contractor shall maintain at least one copy each of the specifications and drawings on the job site at all times.

B. The Owner will provide the Contractor with a suitable set of contract drawings on which daily records of changes and deviations from contract shall be recorded. Dimensions and elevations on the record drawings shall locate all buried or concealed piping, conduit, or similar items.

C. The daily record of changes shall be the responsibility of Contractor's field superintendent. No arbitrary mark-ups will be permitted.

D. At completion of the project, the Contractor shall submit the marked-up record drawings to the Owner and Architect prior to final payment.

PART 2 - PRODUCTS

2.1 ACCESS PANELS AND DOORS

A. Plaster Walls and Ceilings:

1. 16 gauge frame with not less than a 20 gauge hinged door panel, prime coated steel for general applications, stainless steel for use in toilets, showers and similar wet areas, concealed hinges, screwdriver operated cam latch for general application, key lock for use in public areas, UL listed for use in fire rated partitions if required by the application. Use the largest size access opening possible, consistent with the space and the equipment needing service; minimum size is 12" by 12".

2.2 IDENTIFICATION

A. See Electrical section 260553 – Identification for Electrical Systems.

PART 3 - EXECUTION

3.1 EXCAVATION AND BACKFILL

A. Perform all excavation and backfill work to accomplish indicated electrical systems installation. Blasting will not be allowed.

3.2 CONCRETE WORK

A. Confirm with the Construction Manager or General Contractor that the Division 03 Contractor will perform all cast-in-place concrete unless noted otherwise elsewhere. Provide all layout drawings, anchor bolts, metal shapes, and/or templates required to be cast into concrete or used to form concrete for the support of electrical equipment.

3.3 CUTTING AND PATCHING

A. Refer to Division 01, General Requirements, Cutting and Patching.

3.4 EQUIPMENT ACCESS

A. Install all piping, conduit, ductwork, and accessories to permit access to equipment for maintenance.

3.5 COORDINATION

A. The Contractor shall cooperate with other trades in locating work in a proper manner. Should it be necessary to raise or lower or move longitudinally any part of the electrical work to better fit the general installation, such work shall be done at no extra cost to the Owner, provided

such decision is reached prior to actual installation. The Contractor shall check location of electrical outlets with respect to other installations before installing.

B. The Contractor shall verify that all devices are compatible for the surfaces on which they will be used. This includes, but is not limited to light fixtures, panelboards, devices, etc. and recessed or semi-recessed units installed in/on architectural surfaces.

C. Coordinate all work with other contractors prior to installation. Any installed work that is not coordinated and that interferes with other contractor's work shall be removed or relocated at the installing contractor's expense.

D. Verify system completion to the testing consultant. Demonstrate the starting, interlocking and control features of each system so the testing contractor can perform its work.

E. Comply with NECA 1.

F. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.

G. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

H. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

3.6 HOUSEKEEPING AND CLEAN UP

A. The Contractor shall clean up and remove from the premises, on a daily basis, all debris and rubbish resulting from its work and shall repair all damage to new and existing equipment resulting from its work. When job is complete, this Contractor shall remove all tools, excess material and equipment, etc., from the site.

END OF SECTION 26 05 00

SECTION 26 05 00
COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 The electrical work included in all other divisions are the responsibility of the contractor performing the Division 26 work unless noted otherwise.

1.2 PROJECT OVERVIEW

A. Provide power, lighting and special systems for the construction of site lighting for a parking lot for a county transit system.

1.3 SCOPE

A. The work under this section includes basic electrical requirements, which are applicable to all Division 26 sections. This section includes information common to two or more technical specification sections or items that are of a general nature, not conveniently fitting into other technical sections. Included are the following topics:

B. Section Includes:

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f. Quality Assurance
g. Continuity of Existing Services and Systems
h. Protection of Finished Surfaces
i. Approved Electrical Testing Laboratories
j. Sleeves for Raceways and Cables
k. Sleeve Seals
l. Grout
m. Sealing and Firestopping
n. Owner Furnished Equipment
o. Work by Owner
p. Provisions for Future Work
q. Intent
r. Omissions
s. Submittals
t. Salvage Materials
u. Certificates and Inspections
v. Operating and Maintenance Data
w. Training of Owner Personnel
x. Record Drawings

2. PRODUCTS

a. Identification

3. EXECUTION

   a. Excavation and Backfill
   b. Concrete Work
   c. Cutting and Patching
   d. Building Access
   e. Coordination
   f. Housekeeping and Clean Up

4. RELATED WORK

   a. Applicable provisions of Division 01 govern work under this Section.

5. REFERENCE STANDARDS

   a. Abbreviations of standards organizations referenced in this and other sections are as follows:

      1) ANSI American National Standards Institute
      2) ASTM American Society for Testing and Materials
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      12) NFPA National Fire Protection Association
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6. REGULATORY REQUIREMENTS

   a. All work and materials are to conform in every detail to applicable rules and requirements of the National Electrical Code (ANSI/NFPA 70), other applicable National Fire Protection Association codes, the National Electrical Safety Code, and present manufacturing standards (including NEMA).
   b. All Division 26 work shall be done under the direction of a currently certified State of Florida Certified Master Electrician.

7. QUALITY ASSURANCE

   a. Where equipment or accessories are used which differ in arrangement, configuration, dimensions, ratings, or engineering parameters from those indicated on the contract documents, the contractor is responsible for all costs involved in integrating the equipment or accessories into the system and the assigned space and for obtaining the performance from the system into which these items are placed.
   b. Manufacturer references used herein are intended to establish a level of quality and performance requirements unless more explicit restrictions are stated to apply.
   c. All materials, except medium voltage equipment and components, shall be listed by and shall bear the label of an approved electrical testing laboratory. If none of the approved electrical testing laboratories has published standards for a particular

item, then other national independent testing standards, if available, applicable, and approved by DSF, shall apply and such items shall bear those labels. Where one of the approved electrical testing laboratories has an applicable system listing and label, the entire system, except for medium voltage equipment and components, shall be so labeled.

8. CONTINUITY OF EXISTING SERVICES AND SYSTEMS

a. No outages shall be permitted on existing systems except at the time and during the interval specified by the Owner and Architect. This will require written approval. Any outage must be scheduled when the interruption causes the least interference with normal institutional schedules and business routines. No extra costs will be paid to the Contractor for such outages which must occur outside of regular weekly working hours. If required by the serving utility, include these costs in bid.

b. This Contractor shall restore any circuit interrupted as a result of this work to proper operation as soon as possible.

9. PROTECTION OF FINISHED SURFACES

a. Furnish one can of touch-up paint for each different color factory finish furnished by the Contractor. Deliver touch-up paint with other "loose and detachable parts" as covered in the General Requirements.

10. APPROVED ELECTRICAL TESTING LABORATORIES

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B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

C. Sleeves for Rectangular Openings: Galvanized sheet steel.

1. Minimum Metal Thickness:

a. For sleeve cross-section rectangle perimeter less than 50 inches and no side more than 16 inches, thickness shall be 0.052 inch.

b. For sleeve cross-section rectangle perimeter equal to, or more than, 50 inches and 1 or more sides equal to, or more than, 16 inches, thickness shall be 0.138 inch.

1.5 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

1.6 WORK BY OWNER

A. Asbestos abatement and PCB equipment (other than light fixture ballasts) removal and disposal, if required, will be by the Owner under separate contract.

B. Electrical testing not described in these contract documents will be by the Owner under separate contract.

1.7 INTENT

A. The Contractor shall furnish and install all the necessary materials, apparatus, and devices to complete the electrical equipment and systems installation herein specified, except such parts as are specifically exempted herein.

B. If an item is either called for in the specifications or shown on the plans, it shall be considered sufficient for the inclusion of said item in this contract. If a conflict exists within the Specifications or exists within the Drawings, the Contractor shall furnish the item, system, or workmanship, which is the highest quality, largest, or most closely fits the Owners intent). Refer to the General Conditions of the Contract for further clarification.

C. It must be understood that the details and drawings are diagrammatic. The Contractor shall verify all dimensions at the site and be responsible for their accuracy.

D. All sizes as given are minimum except as noted.

E. Materials and labor shall be new (unless noted or stated otherwise), first class, and workmanlike, and shall be subject at all times to the Owner's and Architect's inspections, tests and approval from the commencement until the acceptance of the completed work.

F. Whenever a particular manufacturer's product is named, it is intended to establish a level of quality and performance requirements unless more explicit restrictions are stated to apply.

1.8 OMISSIONS

A. No later than ten (10) days before bid opening, the Contractor shall call the attention of the Owner and Architect to any materials or apparatus the Contractor believes to be inadequate and to any necessary items of work omitted.

1.9 SUBMITTALS

A. Submit for all equipment and systems as indicated in the respective specification sections, marking each submittal with that specification section number. Mark general catalog sheets and drawings to indicate specific items being submitted and proper identification of equipment by name and/or number, as indicated in the contract documents. Failure to do this may result

in the submittal(s) being returned to the Contractor for correction and resubmission. Failing to follow these instructions does not relieve the Contractor from the requirement of meeting the project schedule.

B. On request from the Architect, the successful bidder shall furnish additional drawings, illustrations, catalog data, performance characteristics, etc.

C. Submittals shall be grouped to include complete submittals of related systems, products, and accessories in a single submittal. Mark dimensions and values in units to match those specified. Include wiring diagrams of electrically powered equipment.

D. The submittals must be approved before fabrication is authorized.

E. Submit sufficient quantities of submittals to allow the following distribution:

1.	Operating and Maintenance Manuals	3 copies
2.	Architect	2 copies
3.	Engineer	1 copy

1.10 PROJECT/SITE CONDITIONS

A. Install Work in locations shown on Drawings, unless prevented by Project conditions.

B. Prepare drawings showing proposed rearrangement of Work to meet Project conditions, including changes to Work specified in other Sections. Obtain permission of Owner and Architect before proceeding.

C. Tools, materials and equipment shall be confined to areas designated by the Owner and Architect.

1.11 ASBESTOS ABATEMENT

A. The Owner is responsible for identifying Asbestos Containing Materials (ACMs) in State buildings. Contractor shall not supply or install any materials that contain any amount of asbestos.

1.12 WORK SEQUENCE AND SCHEDULING

A. Install work in phases to accommodate user Owner's occupancy requirements. During the construction period coordinate electrical schedule and operations with the Owner and Architect.

1.13 WORK BY OTHER TRADES

A. Every attempt has been made to indicate in this trade's specifications and drawings all work required of this Contractor. However, there may be additional specific paragraphs in other trade specifications and addenda, and additional notes on drawings for other trades which pertain to this Trade's work, and thus those additional requirements are hereby made a part of these specifications and drawings.

B. Electrical details on drawings for equipment to be provided by others are based on preliminary design data only. This Contractor shall lay out the electrical work and shall be responsible for its correctness to match equipment actually provided by others.

1.14 SALVAGE MATERIALS

A. No materials removed from this project shall be reused. All materials removed shall become the property of and shall be disposed of by the Contractor.

1.15 CERTIFICATES AND INSPECTIONS

A. Obtain and pay for all required installation inspections.

1.16 OPERATION AND MAINTENANCE DATA

A. Assemble material in three-ring or post binders, using an index at the front of each volume and tabs for each system or type of equipment. In addition to the data indicated in the General Requirements, include the following information:

1. Copies of all approved submittals.
2. Manufacturer's wiring diagrams for electrically powered equipment.
3. Records of tests performed to certify compliance with system requirements.
4. Certificates of inspection by regulatory agencies.
5. Parts lists for manufactured equipment.
6. Preventative maintenance recommendations.
7. Warranties.
8. Additional information as indicated in the technical specification sections.

1.17 RECORD DRAWINGS

A. The Contractor shall maintain at least one copy each of the specifications and drawings on the job site at all times.

B. The Owner will provide the Contractor with a suitable set of contract drawings on which daily records of changes and deviations from contract shall be recorded. Dimensions and elevations on the record drawings shall locate all buried or concealed piping, conduit, or similar items.

C. The daily record of changes shall be the responsibility of Contractor's field superintendent. No arbitrary mark-ups will be permitted.

D. At completion of the project, the Contractor shall submit the marked-up record drawings to the Owner and Architect prior to final payment.

PART 2 - PRODUCTS

2.1 ACCESS PANELS AND DOORS

A. Plaster Walls and Ceilings:

1. 16 gauge frame with not less than a 20 gauge hinged door panel, prime coated steel for general applications, stainless steel for use in toilets, showers and similar wet areas, concealed hinges, screwdriver operated cam latch for general application, key lock for use in public areas, UL listed for use in fire rated partitions if required by the application. Use the largest size access opening possible, consistent with the space and the equipment needing service; minimum size is 12" by 12".

2.2 IDENTIFICATION

A. See Electrical section 260553 – Identification for Electrical Systems.

PART 3 - EXECUTION

3.1 EXCAVATION AND BACKFILL

A. Perform all excavation and backfill work to accomplish indicated electrical systems installation. Blasting will not be allowed.

3.2 CONCRETE WORK

A. Confirm with the Construction Manager or General Contractor that the Division 03 Contractor will perform all cast-in-place concrete unless noted otherwise elsewhere. Provide all layout drawings, anchor bolts, metal shapes, and/or templates required to be cast into concrete or used to form concrete for the support of electrical equipment.

3.3 CUTTING AND PATCHING

A. Refer to Division 01, General Requirements, Cutting and Patching.

3.4 EQUIPMENT ACCESS

A. Install all piping, conduit, ductwork, and accessories to permit access to equipment for maintenance.

3.5 COORDINATION

A. The Contractor shall cooperate with other trades in locating work in a proper manner. Should it be necessary to raise or lower or move longitudinally any part of the electrical work to better fit the general installation, such work shall be done at no extra cost to the Owner, provided

such decision is reached prior to actual installation. The Contractor shall check location of electrical outlets with respect to other installations before installing.

B. The Contractor shall verify that all devices are compatible for the surfaces on which they will be used. This includes, but is not limited to light fixtures, panelboards, devices, etc. and recessed or semi-recessed units installed in/on architectural surfaces.

C. Coordinate all work with other contractors prior to installation. Any installed work that is not coordinated and that interferes with other contractor's work shall be removed or relocated at the installing contractor's expense.

D. Verify system completion to the testing consultant. Demonstrate the starting, interlocking and control features of each system so the testing contractor can perform its work.

E. Comply with NECA 1.

F. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.

G. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

H. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

3.6 HOUSEKEEPING AND CLEAN UP

A. The Contractor shall clean up and remove from the premises, on a daily basis, all debris and rubbish resulting from its work and shall repair all damage to new and existing equipment resulting from its work. When job is complete, this Contractor shall remove all tools, excess material and equipment, etc., from the site.

END OF SECTION 26 05 00

SECTION 26 56 00
EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exterior luminaires with lamps and ballasts.
2. Luminaire-mounted photoelectric relays.
3. Poles and accessories.

1.2 STRUCTURAL ANALYSIS CRITERIA FOR POLE SELECTION

A. Dead Load: Weight of luminaire and its horizontal and vertical supports, lowering devices, and supporting structure, applied as stated in AASHTO LTS-4-M.

B. Live Load: Single load of 500 lbf, distributed as stated in AASHTO LTS-4-M.

C. Ice Load: Load of 3 lbf/sq. ft., applied as stated in AASHTO LTS-4-M Ice Load Map.

D. Wind Load: Pressure of wind on pole and luminaire and banners and banner arms, calculated and applied as stated in AASHTO LTS-4-M.

1. Basic wind speed for calculating wind load for poles 50 feet high or less is 130 mph.

a. Wind Importance Factor: 1.15.
b. Minimum Design Life: 25 years.
c. Velocity Conversion Factors: 1.0.

1.3 ACTION SUBMITTALS

A. Product Data: For each luminaire, pole, and support component, arranged in order of lighting unit designation. Include data on features, accessories, and finishes.

B. Shop Drawings: Anchor-bolt templates keyed to specific poles and certified by manufacturer.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with IEEE C2, "National Electrical Safety Code."

C. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, product(s) indicated on Drawings.

2.2 GENERAL REQUIREMENTS FOR LUMINAIRES

A. Luminaires shall comply with UL 1598 and be listed and labeled for installation in wet locations by an NRTL acceptable to authorities having jurisdiction.

1. LER Tests Incandescent Fixtures: Where LER is specified, test according to NEMA LE 5A.
2. LER Tests HID Fixtures: Where LER is specified, test according to NEMA LE 5B.

B. Lateral Light Distribution Patterns: Comply with IESNA RP-8 for parameters of lateral light distribution patterns indicated for luminaires.

C. Metal Parts: Free of burrs and sharp corners and edges.

D. Sheet Metal Components: Corrosion-resistant aluminum unless otherwise indicated. Form and support to prevent warping and sagging.

E. Housings: Rigidly formed, weather- and light-tight enclosures that will not warp, sag, or deform in use. Provide filter/breather for enclosed luminaires.

F. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position. Doors shall be removable for cleaning or replacing lenses. Designed to disconnect ballast when door opens.

G. Exposed Hardware Material: Stainless steel.

H. Plastic Parts: High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.

I. Light Shields: Metal baffles, factory installed and field adjustable, arranged to block light distribution to indicated portion of normally illuminated area or field.

J. Reflecting surfaces shall have minimum reflectance as follows unless otherwise indicated:

1. White Surfaces: 85 percent.
2. Specular Surfaces: 83 percent.
3. Diffusing Specular Surfaces: 75 percent.

K. Lenses and Refractors Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.

L. Luminaire Finish: Manufacturer's standard paint applied to factory-assembled and -tested luminaire before shipping. Where indicated, match finish process and color of pole or support materials.

M. Factory-Applied Finish for Steel Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

1. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning," to remove dirt, oil, grease, and other contaminants that could impair paint bond. Grind welds and polish surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or SSPC-SP 8, "Pickling."
2. Exterior Surfaces: Manufacturer's standard finish consisting of one or more coats of primer and two finish coats of high-gloss, high-build polyurethane enamel.

    a. Color: As selected from manufacturer's standard catalog of colors.

N. Factory-Applied Finish for Aluminum Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
2. Natural Satin Finish: Provide fine, directional, medium satin polish (AA-M32); buff complying with AA-M20; and seal aluminum surfaces with clear, hard-coat wax.
3. Class I, Clear Anodic Finish: AA-M32C22A41 (Mechanical Finish: medium satin; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.
4. Class I, Color Anodic Finish: AA-M32C22A42/A44 (Mechanical Finish: medium satin; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.

O. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps and ballasts. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.

1. Label shall include the following lamp and ballast characteristics:

    a. "USES ONLY" and include specific lamp type.
    b. Lamp tube configuration (twin, quad, triple), base type, and nominal wattage for compact fluorescent luminaires.
    c. Lamp type, wattage, bulb type (ED17, BD56, etc.) and coating (clear or coated) for HID luminaires.
    d. Start type (preheat, rapid start, instant start) compact fluorescent luminaires.
    e. ANSI ballast type (M98, M57, etc.) for HID luminaires.
    f. CCT and CRI for all luminaires.

2.3 BALLASTS FOR HID LAMPS

A. Comply with ANSI C82.4 and UL 1029 and capable of open-circuit operation without reduction of average lamp life. Include the following features unless otherwise indicated:

1. Ballast Circuit: Constant-wattage autotransformer or regulating high-power-factor type.

2. Minimum Starting Temperature: Minus 22 deg F.
3. Normal Ambient Operating Temperature: 104 deg F.
4. Ballast Fuses: One in each ungrounded power supply conductor. Voltage and current ratings as recommended by ballast manufacturer.

2.4 HID LAMPS

A. Metal-Halide Lamps: ANSI C78.43, with minimum CRI 65, and CCT color temperature 4000 K.

B. Pulse-Start, Metal-Halide Lamps: Minimum CRI 65, and CCT color temperature 4000 K.

2.5 GENERAL REQUIREMENTS FOR POLES AND SUPPORT COMPONENTS

A. Structural Characteristics: Comply with AASHTO LTS-4-M.

1. Wind-Load Strength of Poles: Adequate at indicated heights above grade without failure, permanent deflection, or whipping in steady winds of speed indicated in "Structural Analysis Criteria for Pole Selection" Article.
2. Strength Analysis: For each pole, multiply the actual equivalent projected area of luminaires and brackets by a factor of 1.1 to obtain the equivalent projected area to be used in pole selection strength analysis.

B. Luminaire Attachment Provisions: Comply with luminaire manufacturers' mounting requirements. Use stainless-steel fasteners and mounting bolts unless otherwise indicated.

C. Mountings, Fasteners, and Appurtenances: Corrosion-resistant items compatible with support components.

1. Materials: Shall not cause galvanic action at contact points.
2. Anchor Bolts, Leveling Nuts, Bolt Caps, and Washers: Hot-dip galvanized after fabrication unless otherwise indicated.
3. Anchor-Bolt Template: Plywood or steel.

D. Handhole: Oval-shaped, with minimum clear opening of 2-1/2 by 5 inches, with cover secured by stainless-steel captive screws. Provide on all, except wood poles.

E. Concrete Pole Foundations: Cast in place, with anchor bolts to match pole-base flange. Concrete, reinforcement, and formwork are specified in Section 033000 "Cast-in-Place Concrete."

F. Power-Installed Screw Foundations: Factory fabricated by pole manufacturer, with structural steel complying with ASTM A 36/A 36M and hot-dip galvanized according to ASTM A 123/A 123M; and with top-plate and mounting bolts to match pole base flange and strength required to support pole, luminaire, and accessories.

G. Breakaway Supports: Frangible breakaway supports, tested by an independent testing agency acceptable to authorities having jurisdiction, according to AASHTO LTS-4-M.

PART 3 - EXECUTION

3.1 LUMINAIRE INSTALLATION

A. Install lamps in each luminaire.

B. Fasten luminaire to indicated structural supports.

1. Use fastening methods and materials selected to resist seismic forces defined for the application and approved by manufacturer.

C. Adjust luminaires that require field adjustment or aiming. Include adjustment of photoelectric device to prevent false operation of relay by artificial light sources, favoring a north orientation.

3.2 POLE INSTALLATION

A. Alignment: Align pole foundations and poles for optimum directional alignment of luminaires and their mounting provisions on the pole.

B. Clearances: Maintain the following minimum horizontal distances of poles from surface and underground features unless otherwise indicated on Drawings:

1. Fire Hydrants and Storm Drainage Piping: 60 inches.
2. Water, Gas, Electric, Communication, and Sewer Lines: 5 feet.
3. Trees: 15 feet from tree trunk.

C. Embedded Poles with Tamped Earth Backfill: Set poles to depth below finished grade indicated on Drawings, but not less than one-sixth of pole height.

1. Dig holes large enough to permit use of tampers in the full depth of hole.
2. Backfill in 6-inch layers and thoroughly tamp each layer so compaction of backfill is equal to or greater than that of undisturbed earth.

D. Embedded Poles with Concrete Backfill: Set poles in augered holes to depth below finished grade indicated on Drawings, but not less than one-sixth of pole height.

1. Make holes 6 inches in diameter larger than pole diameter.
2. Fill augered hole around pole with air-entrained concrete having a minimum compressive strength of 3000 psi at 28 days, and finish in a dome above finished grade.
3. Use a short piece of 1/2-inch- diameter pipe to make a drain hole through concrete dome. Arrange to drain condensation from interior of pole.
4. Cure concrete a minimum of 72 hours before performing work on pole.

E. Raise and set poles using web fabric slings (not chain or cable).

3.3 CORROSION PREVENTION

A. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum by insulating fittings or treatment.

B. Steel Conduits: Comply with Section 260533 "Raceways and Boxes for Electrical Systems." In concrete foundations, wrap conduit with 0.010-inch- thick, pipe-wrapping plastic tape applied with a 50 percent overlap.

3.4 GROUNDING

A. Ground metal poles and support structures according to Section 260526 "Grounding and Bonding for Electrical Systems."

1. Install grounding electrode for each pole unless otherwise indicated.
2. Install grounding conductor pigtail in the base for connecting luminaire to grounding system.

B. Ground nonmetallic poles and support structures according to Section 260526 "Grounding and Bonding for Electrical Systems."

1. Install grounding electrode for each pole.
2. Install grounding conductor and conductor protector.
3. Ground metallic components of pole accessories and foundations.

END OF SECTION 26 56 00

SECTION 26 43 13
SURGE PROTECTIVE DEVICES (SPD)

PART 1 - GENERAL

1.1 SUMMARY

A. Surge protective devices on power circuits at facility entrances to protect the structure from lightning.

B. Surge protective devices on signal, data, and control lines at facility entrances to protect the structure from lightning.

1.2 SUBMITTALS

A. Drawings: Electrical and mechanical drawings shall be provided by the manufacturer which show unit dimensions, weights, mounting provisions, connection notes, wire size and wiring diagram. The manufacturer shall furnish an installation manual with installation notes, start-up and operating instructions for the specified system. Installation instructions shall clearly state whether the system requires an external overcurrent protection device to maintain the system's UL 1449 listing.

B. Independent Testing:

1. High exposure with the 10 x 1,000• s tests per IEEE C62.41.2 Section 7.2.
2. Life Cycle/Repetitive Testing per C62.45-2002 section B.38 minimum of 2,000 times.

C. National Electrical Code (NEC) 285 - Installation requirements for SPD.

1. Article 285.2, SPD must limit transient voltage by diverting or limiting surge current; it also should prevent continued flow of follow current while remaining capable of repeating these functions. SPD that utilize fuses must have repetitive surge capability that can survive its surge rating and meet UL 1449.
2. Article 285.6, TVSS shall be marked with a short circuit current rating and shall not be installed at a point on the system (ex. service, distribution or branch panels) where the available fault current (AIC rating) is in excess of that rating.

D. UL 1449 stipulation for fused SPD - The manufacturer's authorized representative is required to submit the following:

1. Certify that the SPD is UL 1449 3rd edition listed (UL Card) with UL Card.
2. Indicate the type of internal or external fusing that is incorporated in the SPD and what impact the fusing has on the performance of the device with respect to surge capacity and clamping levels.

1.3 STANDARDS

A. Underwriters Laboratories 1449 - (UL 1449 3rd Edition)
Include Electromagnetic interference filter which provides noise attenuation.

B. National Electrical Code 2008 rev. - (NEC Article 285 SPD installation practice/NEC article 250.56 grounding)
NFPA-78 and CSA - (National Fire Protection Association and Canadian Standards Associations)
ISO 9001:2000 - quality standard
Military standards (mil-std 220B)

C. IEEE (Institute of Electrical and Electronic Engineering Inc.) C62.41.1 and c62.41.2 – 2002 rev. - (system shall be designed to meet c62.41)

1. IEEE C62.41.2-2002 section 7.2 long duration 10 x 1,000 • sec test to be compliant if the device exhibits less than 10% deviation from initial readings. Units must be tested to withstand and pass the 10 x 1,000 • sec test
2. IEEE C62.45 – 2002 rev. - (system shall be tested to meet the C62.45)
3. Category A & B - (0.5 • s x 100 kHz ring wave)
4. Category B3 bi-wave - (8 x 20 • s at 3,000 amperes and 1.2 x 50 • s at 6,000 volts)
5. Category C3 bi-wave - (8 x 20 • s at 10,000 amperes and 1.2 x 50 • s at 20,000 volts)

D. IEEE Std. 1100 (2005) “The Emerald Book” Section 8.4.2.5

E. The fusing elements must be capable of allowing the suppressor’s rated single impulse current to pass through the suppressor at least one time without failure. The system shall be tested to 1,000 sequential per C62.45-2002 section b.38 referencing C62.41.1 and C62.41.2 category c3 combination wave transients. The category c3 combination wave is defined as a 1.2 x 50 microsecond wave at 20,000 volt open circuit voltage waveform and 8 x 20 microsecond wave at 10,000 ampere short circuit current waveform. In addition, the system components shall be tested repetitively 1,000 times testing based on an IEEE c62.33 (MOV test) and c62.35 (sad test) without failure or degradation exceeding ±10%.

F. CBEMA (ITIC) and IEC - (Computer Business Equipment Manufacturers Association or Information Technology Industry Council and International Electrotechnical Commission define clamping voltage tolerance guidelines for sensitive equipment).

G. UL 1449 3rd Edition Voltage Protection Rating (VPR) is assigned to each mode of protection using a combination wave generator at a setting of 6kV, 3kA. SPD shall have a Nominal Discharge Current rating (I_n) of 10kA or 20kA.

H. All manufacturers must comply with above listed standards and any additions current revisions of industry standards. All products that do not comply with current industry standards will not be accepted.

1.4 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of surge suppressors that fails in materials or workmanship within specified warranty period.

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

1.5 RECEIVING, STORING AND PROTECTING

A. Receive, store, protect, and handle products according to NECA 1 *Standard Practices for Good Workmanship in Electrical Construction*.

PART 2 - PRODUCTS

2.1 BRANCH PANEL SUPPRESSORS

A. Acceptable Manufacturers and Models:

1. Current Technology – CGP060
2. LEA International Inc. –SP100
3. Liebert – ACV-111-RKE

No other Manufacturers will be accepted.

B. Device shall meet all specification requirements in section 2.1 except as follows:

1. Equipment shall be a multi-stage parallel protector. Provide voltage configuration as required per contract documents. The equipment's minimum surge current capacity shall be 100kA per phase (L-N plus L-G) and 50kA per mode (L-N, L-G, L-L and N-G).
2. The system protection shall contain a technology that utilizes a symmetrical array of balanced metal oxide varistors (MOV). Each MOV will be individually coordinated to pass UL 1449. The unit shall be non-modular type.
3. Equipment shall provide the following monitoring features: dry contacts and audible alarm with alarm disable switch. Equipment shall utilize a NEMA 4X enclosure.

2.2 ENCLOSURES

A. Indoor Enclosures: NEMA 250 Type 12.

B. Outdoor Enclosures: NEMA 250 Type 4X.

2.3 SURGE PROTECTIVE DEVICES FOR SIGNAL, DATA, AND CONTROL LINES

A. Provide surge protective devices suitable for the protection of signal, data, antenna, and control lines.

1. Select surge protective devices with consideration for aspects such as the frequency, bandwidth, voltage, and current of the signal, data, antenna, or other communications lines and to ensure that insertion losses introduced by the surge protective devices are within acceptable operational limits.
2. Coordinate selection of surge protective devices for signal, data, antenna, and control lines with owner of equipment that is served by the lines.

B. Provide surge protective devices for of signal, data, and control lines that provide both common mode and differential mode protection.

C. Provide surge protective devices for signal, data, control, and alarm lines.

1. Devices shall be listed in accordance with UL 497B Standard for Safety Protectors for Data Communications and Fire Alarm Circuits.
2. Provide devices with ratings and connectors as required by the application.
3. Manufacturer: Transtector Systems, EDCO, MCG Electronics

D. Provide coaxial surge protective devices for antenna and RF signal lines.

1. Devices shall be listed in accordance with UL 497C Standard for Safety Protectors for Coaxial Communications Circuits.
2. Provide devices with ratings and connectors as required by the application.
3. Provide bulkhead plates and low-impedance paths to ground where antenna cables enter the structure.
4. Manufacturers: TII Network Technologies, Inc, Cable Innovations, PolyPhaser.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify mounting area is ready for equipment. Allow adequate clearances for maintenance.

B. Verify that circuit rough-in is at correct location.

3.2 INSTALLATION

A. Install surge protective devices externally mounted to the service entrance, distribution and branch panelboards, as stand-alone units. Internal products will not be accepted.

B. Install surge protective devices where indicated on the Drawings and according to manufacturer's instructions and the *National Electrical Code*. SPD shall be installed with the shortest lead length possible not to exceed five (5') feet for service entrance and distribution and one foot and half (1.5') for branch panelboards from the power conductor(s) it is protecting. Have the manufacturer's installation instructions available at the construction site.

C. Install surge protective device in the service equipment to protect each ungrounded conductor on the line side of the service entrance disconnecting means.

D. Install surge protective device to protect each ungrounded conductor of power circuits that exits the structure to serve external detached equipment or other detached structures. Where such power circuits are longer than 100 ft install surge protective devices to protect each ungrounded conductor at both ends of the circuit.

E. Install UL 497B listed surge protective device for each for signal, data, control, and alarm line that enters the structure or exits the structure to serve external detached equipment or other detached structures. Where such signal, data, control, and alarm circuits are longer than 100 ft install UL 497B listed surge protective device at both ends of the circuit.

F. Install each surge protective device so it will be accessible for inspection and maintenance and so the condition monitoring indicator will be visible without requiring the removal of cover plates.

G. Install each surge protective device with minimum possible conductor length and a maximum conductor length of 18 inches.

1. Twist conductors tightly together and keep runs as straight as possible with no sharp bends or kinks.
2. Use approved means to make connections from the surge protective device to conductors to be protected.

H. Provide low-impedance grounding for surge protective devices.

1. Use approved means to make connections from the surge protective device to the point where the electrical power system grounded conductor is bonded to the grounding electrode conductor.
2. If the surge protective device is more than 20 ft away from the electrical system bonding point, make one or more supplementary grounding electrode connections at the surge protective device location. Use the building “main grounding electrode ground bar”, “main grounding electrode ground bar extensions”, effectively grounded building structural steel, and grounded water pipes as supplementary grounding electrodes.
3. Do not use a lightning protection system down conductor to ground a surge protective device.

3.3 Field Quality Control

A. Provide final protection and maintain conditions to ensure that coatings and finishes are without damage or deterioration at final inspection.

B. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.

C. Repair damage to paint finishes with matching touch-up coating recommended by the manufacturer.

D. Verify that each surge protective device is correctly connected and that all condition monitoring indicators operate properly.

3.4 STARTUP SERVICE

A. Do not energize or connect service entrance equipment and panelboards to their sources until SPD are installed and connected.

B. Do not perform insulation resistance tests of the distribution wiring equipment with the SPD installed. Disconnect before conducting insulation resistance tests, and reconnect immediately after the testing is over.

END OF SECTION 26 43 13

SECTION 26 28 16
ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fusible switches.
2. Nonfusible switches.
3. Shunt trip switches.
4. Molded-case circuit breakers (MCCBs).
5. Enclosures.

1.2 DEFINITIONS

A. NC: Normally closed.

B. NO: Normally open.

C. SPDT: Single pole, double throw.

1.3 SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated.

B. Shop Drawings: For enclosed switches and circuit breakers. Include plans, elevations, sections, details, and attachments to other work.

1. Wiring Diagrams: For power, signal, and control wiring.

C. Field quality-control reports.

D. Operation and maintenance data.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 FUSIBLE SWITCHES

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

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. Siemens Energy & Automation, Inc.
3. Square D; a brand of Schneider Electric.

B. Type HD, Heavy Duty, Single Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate indicated fuses, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

C. Type HD, Heavy Duty, Six Pole, Single Throw, 600-V ac, 200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate indicated fuses, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

D. Type HD, Heavy Duty, Double Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate indicated fuses, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

E. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
4. Lugs: Suitable for number, size, and conductor material.
5. Service-Rated Switches: Labeled for use as service equipment.

2.2 NONFUSIBLE SWITCHES

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

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. Siemens Energy & Automation, Inc.
3. Square D; a brand of Schneider Electric.

B. Type HD, Heavy Duty, Single Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

C. Type HD, Heavy Duty, Six Pole, Single Throw, 600-V ac, 200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

D. Type HD, Heavy Duty, Double Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

E. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Lugs: Suitable for number, size, and conductor material.

2.3 SHUNT TRIP SWITCHES

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

1. Cooper Bussmann, Inc.
2. Ferraz Shawmut, Inc.
3. Littelfuse, Inc.

B. General Requirements: Comply with ASME A17.1, UL 50, and UL 98, with 200-kA interrupting and short-circuit current rating when fitted with Class J fuses.

C. Switches: Three-pole, horsepower rated, with integral shunt trip mechanism and Class J fuse block; lockable handle with capability to accept three padlocks; interlocked with cover in closed position.

D. Control Circuit: 120-V ac; obtained from integral control power transformer, with primary and secondary fuses, with a control power source of enough capacity to operate shunt trip, connected pilot, and indicating and control devices.

E. Accessories:

1. Oiltight key switch for key-to-test function.
2. Oiltight ON pilot light.
3. Isolated neutral lug.
4. Mechanically interlocked auxiliary contacts that change state when switch is opened and closed.
5. Form C alarm contacts that change state when switch is tripped.
6. Three-pole, double-throw, fire-safety and alarm relay; 120-V ac coil voltage.
7. Three-pole, double-throw, fire-alarm voltage monitoring relay complying with NFPA 72.

2.4 MOLDED-CASE CIRCUIT BREAKERS

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

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. Siemens Energy & Automation, Inc.
3. Square D; a brand of Schneider Electric.

B. General Requirements: Comply with UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents.

C. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

D. Electronic Trip Circuit Breakers: Field-replaceable rating plug, rms sensing, with the following field-adjustable settings:

1. Instantaneous trip.
2. Long- and short-time pickup levels.
3. Long- and short-time time adjustments.
4. Ground-fault pickup level, time delay, and I^2t response.

E. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller, and let-through ratings less than NEMA FU 1, RK-5.

F. Features and Accessories:

1. Standard frame sizes, trip ratings, and number of poles.
2. Lugs: Suitable for number, size, trip ratings, and conductor material.
3. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge lighting circuits.
4. Ground-Fault Protection: Comply with UL 1053; integrally mounted, self-powered type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero-sequence current transformer/sensor.
5. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.
6. Auxiliary Contacts: Two SPDT switches with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts, "b" contacts operate in reverse of circuit-breaker contacts.
7. Alarm Switch: One NC contact that operates only when circuit breaker has tripped.

2.5 ENCLOSURES

A. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.

1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
2. Outdoor Locations: NEMA 250, Type 3R.
3. Wash-Down Areas: NEMA 250,, stainless steel.
4. Other Wet or Damp, Indoor Locations: NEMA 250, Type 4.
5. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.

B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

C. Install fuses in fusible devices.

D. Comply with NECA 1.

3.2 IDENTIFICATION

A. Comply with requirements in Division 26 Section "Identification for Electrical Systems."

1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Acceptance Testing Preparation:

1. Test insulation resistance for each enclosed switch and circuit breaker, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

C. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

D. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports, including a certified report that identifies enclosed switches and circuit breakers and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

END OF SECTION 26 28 16

SECTION 26 28 13
FUSES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Cartridge fuses rated 600-V ac and less for use in control circuits, enclosed switches, panelboards, switchboards, enclosed controllers and motor-control centers.

1.2 SUBMITTALS

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

B. Operation and maintenance data.

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NEMA FU 1 for cartridge fuses.

C. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Cooper Bussmann, Inc.
2. Edison Fuse, Inc.
3. Ferraz Shawmut, Inc.
4. Littelfuse, Inc.

2.2 CARTRIDGE FUSES

A. Characteristics: NEMA FU 1, nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages.

PART 3 - EXECUTION

3.1 FUSE APPLICATIONS

A. Service Entrance: Class L, time delay.

B. Feeders: Class J, time delay.

C. Motor Branch Circuits: Class RK5, time delay.

D. Other Branch Circuits: Class J, fast acting.

E. Control Circuits: Class CC, fast acting.

3.2 INSTALLATION

A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.

3.3 IDENTIFICATION

A. Install labels complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems" and indicating fuse replacement information on inside door of each fused switch and adjacent to each fuse block and holder.

END OF SECTION 26 28 13

SECTION 26 09 23
LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Time switches.
2. Photoelectric switches.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data

PART 2 - PRODUCTS

2.1 TIME SWITCHES

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Cooper Industries, Inc.
2. Intermatic, Inc.
3. Leviton Mfg. Company Inc.

B. Electronic Time Switches: Solid state, programmable, with alphanumeric display; complying with UL 917.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Contact Configuration: SPST.
3. Contact Rating: 20-A ballast load, 120-/240-V ac.
4. Programs: Eight on-off set points on a 24-hour schedule and an annual holiday schedule that overrides the weekly operation on holidays.
5. Circuitry: Allow connection of a photoelectric relay as substitute for on-off function of a program.

6. Astronomic Time: All channels.
7. Automatic daylight savings time changeover.
8. Battery Backup: Not less than seven days reserve, to maintain schedules and time clock.

C. Electromechanical-Dial Time Switches: Comply with UL 917.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Contact Configuration: SPST.
3. Contact Rating: 20-A ballast load, 120-/240-V ac.
4. Circuitry: Allows connection of a photoelectric relay as a substitute for the on-off function of a program.
5. Astronomic time dial.
6. Eight-Day Program: Uniquely programmable for each weekday and holidays.
7. Skip-a-day mode.

2.2 OUTDOOR PHOTOELECTRIC SWITCHES

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Cooper Industries, Inc.
2. Intermatic, Inc.
3. Tyco Electronics; ALR Brand.

B. Description: Solid state, with SPST dry contacts rated for 1800 VA, to operate connected load, complying with UL 773.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Light-Level Monitoring Range: 1.5 to 10 fc, with an adjustment for turn-on and turn-off levels within that range.
3. Time Delay: Thirty-second minimum, to prevent false operation.
4. Lightning Arrester: Air-gap type.
5. Mounting: Twist lock complying with NEMA C136.10, with base.

2.3 LIGHTING CONTACTORS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Allen-Bradley/Rockwell Automation.
2. ASCO Power Technologies, LP; a division of Emerson Electric Co.
3. Eaton Corporation.
4. Square D; a brand of Schneider Electric.

B. Description: Electrically operated and mechanically held, combination-type lighting contactors with fusible switch, complying with NEMA ICS 2 and UL 508.

1. Current Rating for Switching: Listing or rating consistent with type of load served, including tungsten filament, inductive, and high-inrush ballast (ballast with 15 percent or less total harmonic distortion of normal load current).

2. Fault Current Withstand Rating: Equal to or exceeding the available fault current at the point of installation.
3. Enclosure: Comply with NEMA 250.
4. Provide with control and pilot devices as indicated on Drawings, matching the NEMA type specified for the enclosure.

2.4 CONDUCTORS AND CABLES

A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements.

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Operational Test: After installing time switches and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Lighting control devices will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION 26 09 23

SECTION 26 05 53
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Identification for raceways.
2. Identification of power and control cables.
3. Identification for conductors.
4. Underground-line warning tape.
5. Warning labels and signs.
6. Instruction signs.
7. Equipment identification labels.
8. Miscellaneous identification products.

1.2 SUBMITTALS

A. Product Data: For each electrical identification product indicated.

1.3 QUALITY ASSURANCE

A. Comply with ANSI A13.1.

B. Comply with NFPA 70.

C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

D. Comply with ANSI Z535.4 for safety signs and labels.

E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

PART 2 - PRODUCTS

2.1 POWER RACEWAY IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.

B. Colors for Raceways Carrying Circuits at 600 V or Less:

1. Black letters on an orange field.
2. Legend: Indicate voltage.

C. Self-Adhesive Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

D. Snap-Around Labels for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

E. Snap-Around, Color-Coding Bands for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

F. Specify thicker tags in paragraph below where exposed to damage or to rough service.

G. Write-On Tags: Polyester tag, 0.015 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.

H. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
1. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

2.2 ARMORED AND METAL-CLAD CABLE IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.

B. Colors for Raceways Carrying Circuits at 600 V and Less:

1. Black letters on an orange field.
2. Legend: Indicate voltage.

C. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

D. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; 2 inches wide; compounded for outdoor use.

2.3 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.

B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

C. Write-On Tags: Polyester tag, 0.010 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.

1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.

2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

D. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

E. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

F. CONDUCTOR IDENTIFICATION MATERIALS

G. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.

H. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

I. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

J. Write-On Tags: Polyester tag, 0.010 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.

1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

2.4 FLOOR MARKING TAPE

1. 2-inch- wide, 5-mil pressure-sensitive vinyl tape, with black and white stripes and clear vinyl overlay.

2.5 UNDERGROUND-LINE WARNING TAPE

A. Tape:

1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
2. Printing on tape shall be permanent and shall not be damaged by burial operations.
3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.

B. Color and Printing:

1. Comply with ANSI Z535.1 through ANSI Z535.5.
2. Inscriptions for Red-Colored Tapes: ELECTRIC LINE, HIGH VOLTAGE.
3. Inscriptions for Orange-Colored Tapes: TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE.

C. Tag: Type I:

1. Pigmented polyolefin, bright-colored,compounded for direct-burial service.
2. Thickness: 4 mils.
3. Weight: 18.5 lb/1000 sq. ft..
4. 3-Inch Tensile According to ASTM D 882: 30 lbf, and 2500 psi.

D. Tag: Type ID:

1. Detectable three-layer laminate, consisting of a printed pigmented polyolefin film, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core, bright-colored,compounded for direct-burial service.
2. Overall Thickness: 5 mils.
3. Foil Core Thickness: 0.35 mil.
4. Weight: 28 lb/1000 sq. ft..
5. 3-Inch Tensile According to ASTM D 882: 70 lbf, and 4600 psi.

2.6 WARNING LABELS AND SIGNS

A. Comply with NFPA 70 and 29 CFR 1910.145.

B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.

C. Baked-Enamel Warning Signs:

1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
2. 1/4-inch grommets in corners for mounting.
3. Nominal size, 7 by 10 inches.

D. Metal-Backed, Butyrate Warning Signs:

1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch galvanized-steel backing; and with colors, legend, and size required for application.
2. 1/4-inch grommets in corners for mounting.
3. Nominal size, 10 by 14 inches.

E. Warning label and sign shall include, but are not limited to, the following legends:

1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."

2.7 INSTRUCTION SIGNS

A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch thick for signs up to 20 sq. inches and 1/8 inch thick for larger sizes.

1. Engraved legend with black letters on white face.
2. Punched or drilled for mechanical fasteners.
3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

B. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch.

C. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch. Overlay shall provide a weatherproof and UV-resistant seal for label.

2.8 EQUIPMENT IDENTIFICATION LABELS

A. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch. Overlay shall provide a weatherproof and UV-resistant seal for label.

B. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch.

C. Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height shall be 1 inch.

2.9 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in Division 09 painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

B. Apply identification devices to surfaces that require finish after completing finish work.

C. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.

D. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.

E. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.

F. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches overall.

G. Painted Identification: Comply with requirements in Division 09 painting Sections for surface preparation and paint application.

3.2 IDENTIFICATION SCHEDULE

A. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits More Than 30 A, and 120 V to ground: Install labels at 10-foot maximum intervals.

B. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage. System legends shall be as follows:
1. Power.

C. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.

1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded service, feeder, and branch-circuit conductors.

a. Color shall be factory applied.
b. Colors for 208/120-V Circuits:

1) Phase A: Black.
2) Phase B: Red.
3) Phase C: Blue.

c. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

D. Install instructional sign including the color-code for grounded and ungrounded conductors using adhesive-film-type labels.

E. Conductors to Be Extended in the Future: Attach write-on tags to conductors and list source.

F. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.

1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.

G. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.
   1. Install underground-line warning tape for both direct-buried cables and cables in raceway.

H. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.

I. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Metal-backed, butyrate warning signs.

   1. Comply with 29 CFR 1910.145.
   2. Identify system voltage with black letters on an orange background.
   3. Apply to exterior of door, cover, or other access.
   4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:

      a. Power transfer switches.
      b. Controls with external control power connections.

J. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.

K. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch- high letters for emergency instructions at equipment used for power transfer.

L. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.

   1. Labeling Instructions:

      a. Outdoor Equipment: Engraved, laminated acrylic or melamine label Stenciled legend 4 inches high.
      b. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
      c. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.

END OF SECTION 26 05 53

SECTION 26 05 33
RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

1.2 SUBMITTALS

A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, details, and attachments to other work.

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 METAL CONDUIT AND TUBING

A. Rigid Steel Conduit: ANSI C80.1.

B. IMC: ANSI C80.6.

C. EMT: ANSI C80.3.

D. FMC: Zinc-coated steel.

E. LFMC: Flexible steel conduit with PVC jacket.

F. Fittings for Conduit (Including all Types and Flexible and Liquidtight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.

1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886.
2. Fittings for EMT: Steel or die-cast, set-screw or compression type.

2.2 NONMETALLIC CONDUIT AND TUBING

A. ENT: NEMA TC 13.

B. RNC: NEMA TC 2, Type EPC-40-PVC, unless otherwise indicated.

C. LFNC: UL 1660.

D. Fittings for ENT and RNC: NEMA TC 3; match to conduit or tubing type and material.

E. Fittings for LFNC: UL 514B.

2.3 METAL WIREWAYS

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

1. Cooper B-Line, Inc.
2. Hoffman.
3. Square D; Schneider Electric.

B. Description: Sheet metal sized and shaped as indicated, NEMA 250, Type 3R, unless otherwise indicated.

C. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

D. Wireway Covers: Flanged-and-gasketed type.

E. Finish: Manufacturer's standard enamel finish.

2.4 NONMETALLIC WIREWAYS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Hoffman.
2. Lamson & Sessions; Carlon Electrical Products.

B. Description: PVC plastic, extruded and fabricated to size and shape indicated, with snap-on cover and mechanically coupled connections with plastic fasteners.

C. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

2.5 SURFACE RACEWAYS

A. Surface Metal Raceways: Galvanized steel with snap-on covers. Manufacturer's standard enamel finish in color selected by Architect.

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

    a. Thomas & Betts Corporation.
    b. Walker Systems, Inc.; Wiremold Company (The).
    c. Wiremold Company (The); Electrical Sales Division.

B. Surface Nonmetallic Raceways: Two-piece construction, manufactured of rigid PVC with texture and color selected by Architect from manufacturer's standard colors.

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

    a. Butler Manufacturing Company; Walker Division.
    b. Enduro Systems, Inc.; Composite Products Division.
    c. Hubbell Incorporated; Wiring Device-Kellems Division.
    d. Lamson & Sessions; Carlon Electrical Products.
    e. Panduit Corp.
    f. Walker Systems, Inc.; Wiremold Company (The).
    g. Wiremold Company (The); Electrical Sales Division.

2.6 BOXES, ENCLOSURES, AND CABINETS

A. Sheet Metal Outlet and Device Boxes: NEMA OS 1.

B. Cast-Metal Outlet and Device Boxes: NEMA FB 1, aluminum, Type FD, with gasketed cover.

C. Nonmetallic Outlet and Device Boxes: NEMA OS 2.

D. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

E. Cast-Metal Access, Pull, and Junction Boxes: NEMA FB 1, cast aluminum with gasketed cover.

F. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous-hinge cover with flush latch, unless otherwise indicated.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
2. Nonmetallic Enclosures: Plastic, finished inside with radio-frequency-resistant paint.

G. Cabinets:

1. NEMA 250, Type 1, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
2. Hinged door in front cover with flush latch and concealed hinge.
3. Key latch to match panelboards.
4. Metal barriers to separate wiring of different systems and voltage.
5. Accessory feet where required for freestanding equipment.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below, unless otherwise indicated:

1. Exposed Conduit: Rigid steel conduit.
2. Concealed Conduit, Aboveground: Rigid steel conduit.
3. Underground Conduit: RNC, Type EPC-40-PVC, direct buried.
4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.

B. Comply with the following indoor applications, unless otherwise indicated:

1. Exposed, Not Subject to Physical Damage: EMT.
2. Exposed, Not Subject to Severe Physical Damage: EMT.
3. Exposed and Subject to Severe Physical Damage: Rigid steel conduit. Includes raceways in the following locations:

    a. Loading dock.
    b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
    c. Mechanical rooms.

4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
6. Damp or Wet Locations: Rigid steel conduit or IMC.
7. Raceways for Optical Fiber or Communications Cable: EMT.
8. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4, stainless steel in damp or wet locations.

C. Minimum Raceway Size: 3/4-inch trade size.

D. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.

3.2 INSTALLATION

A. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter.

B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

C. Complete raceway installation before starting conductor installation.

D. Support raceways as specified in Division 26 Section "Hangers and Supports for Electrical Systems."

E. Arrange stub-ups so curved portions of bends are not visible above the finished slab.

F. Install no more than the equivalent of three 90-degree bends in any conduit run except for communications conduits, for which fewer bends are allowed.

G. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.

H. Raceways Embedded in Slabs:

1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
3. Change from ENT to RNC, Type EPC-40-PVC, rigid steel conduit, or IMC before rising above the floor.

I. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors, including conductors smaller than No. 4 AWG.

J. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire.

K. Raceways for Optical Fiber and Communications Cable: Install as follows:

1. 3/4-Inch Trade Size and Smaller: Install raceways in maximum lengths of 50 feet.
2. 1-Inch Trade Size and Larger: Install raceways in maximum lengths of 75 feet.
3. Install with a maximum of two 90-degree bends or equivalent for each length of raceway unless Drawings show stricter requirements. Separate lengths with pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements.

L. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where otherwise required by NFPA 70.

M. Expansion-Joint Fittings for RNC: Install in each run of aboveground conduit that is located where environmental temperature change may exceed 30 deg F, and that has straight-run length that exceeds 25 feet.

1. Install expansion-joint fittings for each of the following locations, and provide type and quantity of fittings that accommodate temperature change listed for location:

a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.
c. Indoor Spaces: Connected with the Outdoors without Physical Separation: 125 deg F temperature change.
d. Attics: 135 deg F temperature change.

2. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change.
3. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at the time of installation.

N. Flexible Conduit Connections: Use maximum of 72 inches of flexible conduit for recessed and semirecessed lighting fixtures, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

1. Use LFMC in damp or wet locations subject to severe physical damage.
2. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.

O. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified for pipe less than 6 inches in nominal diameter.
2. Install backfill as specified .
3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Division 30.
4. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through the floor, unless otherwise indicated. Encase elbows for stub-up ducts throughout the length of the elbow.
5. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through the floor.

    a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete.
    b. For stub-ups at equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of 60 inches from edge of equipment pad or foundation. Install insulated grounding bushings on terminations at equipment.

6. Warning Tape: Bury warning tape approximately 12 inches above direct-buried conduits. Align tape along the width and along the centerline of conduit.

END OF SECTION 26 05 33

SECTION 26 05 26
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Grounding systems and equipment.

1.2 SUBMITTALS

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

B. Field quality-control reports.

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 CONDUCTORS

A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

B. Bare Copper Conductors:

1. Solid Conductors: ASTM B 3.
2. Stranded Conductors: ASTM B 8.
3. Tinned Conductors: ASTM B 33.
4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

2.2 CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, pressure type with at least two bolts.

1. Pipe Connectors: Clamp type, sized for pipe.

C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

2.3 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel, sectional type; 3/4 inch by 10 feet in diameter.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.

B. Underground Grounding Conductors: Install bare tinned-copper conductor, No. 2/0 AWG minimum. Bury at least 24 inches below grade.

C. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
3. Connections to Ground Rods at Test Wells: Bolted connectors.
4. Connections to Structural Steel: Welded connectors.

3.2 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:

1. Feeders and branch circuits.
2. Lighting circuits.

3.3 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.

1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.

C. Test Wells: Ground rod driven through drilled hole in bottom of handhole. Handholes are specified in Division 26 and shall be at least 12 inches deep, with cover.

1. Test Wells: Install at least one test well for each service unless otherwise indicated. Install at the ground rod electrically closest to service entrance. Set top of test well flush with finished grade or floor.

D. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.

1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.

3.4 LABELING

A. Comply with requirements in Division 26 Section "Identification for Electrical Systems" Article for instruction signs. The label or its text shall be green.

B. Install labels at the telecommunications bonding conductor and grounding equalizer and at the grounding electrode conductor where exposed.

1. Label Text: "If this connector or cable is loose or if it must be removed for any reason, notify the facility manager."

3.5 FIELD QUALITY CONTROL

A. Perform the following tests and inspections and prepare test reports:

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at ground test wells. Make tests at ground rods before any conductors are connected.

B. Report measured ground resistances that exceed the following values:

1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.
2. Power and Lighting Equipment or System with Capacity of 500 to 1000 kVA: 5 ohms.
3. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 ohms.

4. Power Distribution Units or Panelboards Serving Electronic Equipment: 1 ohm(s).

C. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 26 05 26

SECTION 26 05 33
RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

1.2 SUBMITTALS

A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, details, and attachments to other work.

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 METAL CONDUIT AND TUBING

A. Rigid Steel Conduit: ANSI C80.1.

B. IMC: ANSI C80.6.

C. EMT: ANSI C80.3.

D. FMC: Zinc-coated steel.

E. LFMC: Flexible steel conduit with PVC jacket.

F. Fittings for Conduit (Including all Types and Flexible and Liquidtight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.

1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886.
2. Fittings for EMT: Steel or die-cast, set-screw or compression type.

2.2 NONMETALLIC CONDUIT AND TUBING

A. ENT: NEMA TC 13.

B. RNC: NEMA TC 2, Type EPC-40-PVC, unless otherwise indicated.

C. LFNC: UL 1660.

D. Fittings for ENT and RNC: NEMA TC 3; match to conduit or tubing type and material.

E. Fittings for LFNC: UL 514B.

2.3 METAL WIREWAYS

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

1. Cooper B-Line, Inc.
2. Hoffman.
3. Square D; Schneider Electric.

B. Description: Sheet metal sized and shaped as indicated, NEMA 250, Type 3R, unless otherwise indicated.

C. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

D. Wireway Covers: Flanged-and-gasketed type.

E. Finish: Manufacturer's standard enamel finish.

2.4 NONMETALLIC WIREWAYS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Hoffman.
2. Lamson & Sessions; Carlon Electrical Products.

B. Description: PVC plastic, extruded and fabricated to size and shape indicated, with snap-on cover and mechanically coupled connections with plastic fasteners.

C. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

2.5 SURFACE RACEWAYS

A. Surface Metal Raceways: Galvanized steel with snap-on covers. Manufacturer's standard enamel finish in color selected by Architect.

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

    a. Thomas & Betts Corporation.
    b. Walker Systems, Inc.; Wiremold Company (The).
    c. Wiremold Company (The); Electrical Sales Division.

B. Surface Nonmetallic Raceways: Two-piece construction, manufactured of rigid PVC with texture and color selected by Architect from manufacturer's standard colors.

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

    a. Butler Manufacturing Company; Walker Division.
    b. Enduro Systems, Inc.; Composite Products Division.
    c. Hubbell Incorporated; Wiring Device-Kellems Division.
    d. Lamson & Sessions; Carlon Electrical Products.
    e. Panduit Corp.
    f. Walker Systems, Inc.; Wiremold Company (The).
    g. Wiremold Company (The); Electrical Sales Division.

2.6 BOXES, ENCLOSURES, AND CABINETS

A. Sheet Metal Outlet and Device Boxes: NEMA OS 1.

B. Cast-Metal Outlet and Device Boxes: NEMA FB 1, aluminum, Type FD, with gasketed cover.

C. Nonmetallic Outlet and Device Boxes: NEMA OS 2.

D. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

E. Cast-Metal Access, Pull, and Junction Boxes: NEMA FB 1, cast aluminum with gasketed cover.

F. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous-hinge cover with flush latch, unless otherwise indicated.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
2. Nonmetallic Enclosures: Plastic, finished inside with radio-frequency-resistant paint.

G. Cabinets:

1. NEMA 250, Type 1, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
2. Hinged door in front cover with flush latch and concealed hinge.
3. Key latch to match panelboards.
4. Metal barriers to separate wiring of different systems and voltage.
5. Accessory feet where required for freestanding equipment.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below, unless otherwise indicated:

1. Exposed Conduit: Rigid steel conduit.
2. Concealed Conduit, Aboveground: Rigid steel conduit.
3. Underground Conduit: RNC, Type EPC-40-PVC, direct buried.
4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.

B. Comply with the following indoor applications, unless otherwise indicated:

1. Exposed, Not Subject to Physical Damage: EMT.
2. Exposed, Not Subject to Severe Physical Damage: EMT.
3. Exposed and Subject to Severe Physical Damage: Rigid steel conduit. Includes raceways in the following locations:

    a. Loading dock.
    b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
    c. Mechanical rooms.

4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
6. Damp or Wet Locations: Rigid steel conduit or IMC.
7. Raceways for Optical Fiber or Communications Cable: EMT.
8. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4, stainless steel in damp or wet locations.

C. Minimum Raceway Size: 3/4-inch trade size.

D. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.

3.2 INSTALLATION

A. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter.

B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

C. Complete raceway installation before starting conductor installation.

D. Support raceways as specified in Division 26 Section "Hangers and Supports for Electrical Systems."

E. Arrange stub-ups so curved portions of bends are not visible above the finished slab.

F. Install no more than the equivalent of three 90-degree bends in any conduit run except for communications conduits, for which fewer bends are allowed.

G. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.

H. Raceways Embedded in Slabs:

1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
3. Change from ENT to RNC, Type EPC-40-PVC, rigid steel conduit, or IMC before rising above the floor.

I. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors, including conductors smaller than No. 4 AWG.

J. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire.

K. Raceways for Optical Fiber and Communications Cable: Install as follows:

1. 3/4-Inch Trade Size and Smaller: Install raceways in maximum lengths of 50 feet.
2. 1-Inch Trade Size and Larger: Install raceways in maximum lengths of 75 feet.
3. Install with a maximum of two 90-degree bends or equivalent for each length of raceway unless Drawings show stricter requirements. Separate lengths with pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements.

L. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where otherwise required by NFPA 70.

M. Expansion-Joint Fittings for RNC: Install in each run of aboveground conduit that is located where environmental temperature change may exceed 30 deg F, and that has straight-run length that exceeds 25 feet.

1. Install expansion-joint fittings for each of the following locations, and provide type and quantity of fittings that accommodate temperature change listed for location:

a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.
c. Indoor Spaces: Connected with the Outdoors without Physical Separation: 125 deg F temperature change.
d. Attics: 135 deg F temperature change.

2. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change.
3. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at the time of installation.

N. Flexible Conduit Connections: Use maximum of 72 inches of flexible conduit for recessed and semirecessed lighting fixtures, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

1. Use LFMC in damp or wet locations subject to severe physical damage.
2. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.

O. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified for pipe less than 6 inches in nominal diameter.
2. Install backfill as specified .
3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Division 30.
4. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through the floor, unless otherwise indicated. Encase elbows for stub-up ducts throughout the length of the elbow.
5. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through the floor.

    a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete.
    b. For stub-ups at equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of 60 inches from edge of equipment pad or foundation. Install insulated grounding bushings on terminations at equipment.

6. Warning Tape: Bury warning tape approximately 12 inches above direct-buried conduits. Align tape along the width and along the centerline of conduit.

END OF SECTION 26 05 33

SECTION 26 05 53
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Identification for raceways.
2. Identification of power and control cables.
3. Identification for conductors.
4. Underground-line warning tape.
5. Warning labels and signs.
6. Instruction signs.
7. Equipment identification labels.
8. Miscellaneous identification products.

1.2 SUBMITTALS

A. Product Data: For each electrical identification product indicated.

1.3 QUALITY ASSURANCE

A. Comply with ANSI A13.1.

B. Comply with NFPA 70.

C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

D. Comply with ANSI Z535.4 for safety signs and labels.

E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

PART 2 - PRODUCTS

2.1 POWER RACEWAY IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.

B. Colors for Raceways Carrying Circuits at 600 V or Less:

1. Black letters on an orange field.
2. Legend: Indicate voltage.

C. Self-Adhesive Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

D. Snap-Around Labels for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

E. Snap-Around, Color-Coding Bands for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

F. Specify thicker tags in paragraph below where exposed to damage or to rough service.

G. Write-On Tags: Polyester tag, 0.015 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.

H. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
1. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

2.2 ARMORED AND METAL-CLAD CABLE IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.

B. Colors for Raceways Carrying Circuits at 600 V and Less:

1. Black letters on an orange field.
2. Legend: Indicate voltage.

C. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

D. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; 2 inches wide; compounded for outdoor use.

2.3 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.

B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

C. Write-On Tags: Polyester tag, 0.010 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.

1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.

2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

D. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

E. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

F. CONDUCTOR IDENTIFICATION MATERIALS

G. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.

H. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

I. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

J. Write-On Tags: Polyester tag, 0.010 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.

1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

2.4 FLOOR MARKING TAPE

1. 2-inch- wide, 5-mil pressure-sensitive vinyl tape, with black and white stripes and clear vinyl overlay.

2.5 UNDERGROUND-LINE WARNING TAPE

A. Tape:

1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
2. Printing on tape shall be permanent and shall not be damaged by burial operations.
3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.

B. Color and Printing:

1. Comply with ANSI Z535.1 through ANSI Z535.5.
2. Inscriptions for Red-Colored Tapes: ELECTRIC LINE, HIGH VOLTAGE.
3. Inscriptions for Orange-Colored Tapes: TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE.

C. Tag: Type I:

1. Pigmented polyolefin, bright-colored,compounded for direct-burial service.
2. Thickness: 4 mils.
3. Weight: 18.5 lb/1000 sq. ft..
4. 3-Inch Tensile According to ASTM D 882: 30 lbf, and 2500 psi.

D. Tag: Type ID:

1. Detectable three-layer laminate, consisting of a printed pigmented polyolefin film, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core, bright-colored,compounded for direct-burial service.
2. Overall Thickness: 5 mils.
3. Foil Core Thickness: 0.35 mil.
4. Weight: 28 lb/1000 sq. ft..
5. 3-Inch Tensile According to ASTM D 882: 70 lbf, and 4600 psi.

2.6 WARNING LABELS AND SIGNS

A. Comply with NFPA 70 and 29 CFR 1910.145.

B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.

C. Baked-Enamel Warning Signs:

1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
2. 1/4-inch grommets in corners for mounting.
3. Nominal size, 7 by 10 inches.

D. Metal-Backed, Butyrate Warning Signs:

1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch galvanized-steel backing; and with colors, legend, and size required for application.
2. 1/4-inch grommets in corners for mounting.
3. Nominal size, 10 by 14 inches.

E. Warning label and sign shall include, but are not limited to, the following legends:

1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."

2.7 INSTRUCTION SIGNS

A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch thick for signs up to 20 sq. inches and 1/8 inch thick for larger sizes.

1. Engraved legend with black letters on white face.
2. Punched or drilled for mechanical fasteners.
3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

B. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch.

C. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch. Overlay shall provide a weatherproof and UV-resistant seal for label.

2.8 EQUIPMENT IDENTIFICATION LABELS

A. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch. Overlay shall provide a weatherproof and UV-resistant seal for label.

B. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch.

C. Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height shall be 1 inch.

2.9 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in Division 09 painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

B. Apply identification devices to surfaces that require finish after completing finish work.

C. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.

D. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.

E. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.

F. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches overall.

G. Painted Identification: Comply with requirements in Division 09 painting Sections for surface preparation and paint application.

3.2 IDENTIFICATION SCHEDULE

A. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits More Than 30 A, and 120 V to ground: Install labels at 10-foot maximum intervals.

B. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage. System legends shall be as follows:
1. Power.

C. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.

1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded service, feeder, and branch-circuit conductors.

a. Color shall be factory applied.
b. Colors for 208/120-V Circuits:

1) Phase A: Black.
2) Phase B: Red.
3) Phase C: Blue.

c. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

D. Install instructional sign including the color-code for grounded and ungrounded conductors using adhesive-film-type labels.

E. Conductors to Be Extended in the Future: Attach write-on tags to conductors and list source.

F. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.

1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.

G. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.
   1. Install underground-line warning tape for both direct-buried cables and cables in raceway.

H. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.

I. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Metal-backed, butyrate warning signs.

   1. Comply with 29 CFR 1910.145.
   2. Identify system voltage with black letters on an orange background.
   3. Apply to exterior of door, cover, or other access.
   4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:

      a. Power transfer switches.
      b. Controls with external control power connections.

J. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.

K. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch- high letters for emergency instructions at equipment used for power transfer.

L. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.

   1. Labeling Instructions:

      a. Outdoor Equipment: Engraved, laminated acrylic or melamine label Stenciled legend 4 inches high.
      b. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
      c. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.

END OF SECTION 26 05 53

SECTION 26 09 23
LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Time switches.
2. Photoelectric switches.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data

PART 2 - PRODUCTS

2.1 TIME SWITCHES

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Cooper Industries, Inc.
2. Intermatic, Inc.
3. Leviton Mfg. Company Inc.

B. Electronic Time Switches: Solid state, programmable, with alphanumeric display; complying with UL 917.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Contact Configuration: SPST.
3. Contact Rating: 20-A ballast load, 120-/240-V ac.
4. Programs: Eight on-off set points on a 24-hour schedule and an annual holiday schedule that overrides the weekly operation on holidays.
5. Circuitry: Allow connection of a photoelectric relay as substitute for on-off function of a program.

6. Astronomic Time: All channels.
7. Automatic daylight savings time changeover.
8. Battery Backup: Not less than seven days reserve, to maintain schedules and time clock.

C. Electromechanical-Dial Time Switches: Comply with UL 917.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Contact Configuration: SPST.
3. Contact Rating: 20-A ballast load, 120-/240-V ac.
4. Circuitry: Allows connection of a photoelectric relay as a substitute for the on-off function of a program.
5. Astronomic time dial.
6. Eight-Day Program: Uniquely programmable for each weekday and holidays.
7. Skip-a-day mode.

2.2 OUTDOOR PHOTOELECTRIC SWITCHES

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Cooper Industries, Inc.
2. Intermatic, Inc.
3. Tyco Electronics; ALR Brand.

B. Description: Solid state, with SPST dry contacts rated for 1800 VA, to operate connected load, complying with UL 773.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Light-Level Monitoring Range: 1.5 to 10 fc, with an adjustment for turn-on and turn-off levels within that range.
3. Time Delay: Thirty-second minimum, to prevent false operation.
4. Lightning Arrester: Air-gap type.
5. Mounting: Twist lock complying with NEMA C136.10, with base.

2.3 LIGHTING CONTACTORS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Allen-Bradley/Rockwell Automation.
2. ASCO Power Technologies, LP; a division of Emerson Electric Co.
3. Eaton Corporation.
4. Square D; a brand of Schneider Electric.

B. Description: Electrically operated and mechanically held, combination-type lighting contactors with fusible switch, complying with NEMA ICS 2 and UL 508.

1. Current Rating for Switching: Listing or rating consistent with type of load served, including tungsten filament, inductive, and high-inrush ballast (ballast with 15 percent or less total harmonic distortion of normal load current).

2. Fault Current Withstand Rating: Equal to or exceeding the available fault current at the point of installation.
3. Enclosure: Comply with NEMA 250.
4. Provide with control and pilot devices as indicated on Drawings, matching the NEMA type specified for the enclosure.

2.4 CONDUCTORS AND CABLES

A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements.

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Operational Test: After installing time switches and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Lighting control devices will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION 26 09 23

SECTION 26 28 13
FUSES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Cartridge fuses rated 600-V ac and less for use in control circuits, enclosed switches, panelboards, switchboards, enclosed controllers and motor-control centers.

1.2 SUBMITTALS

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

B. Operation and maintenance data.

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NEMA FU 1 for cartridge fuses.

C. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Cooper Bussmann, Inc.
2. Edison Fuse, Inc.
3. Ferraz Shawmut, Inc.
4. Littelfuse, Inc.

2.2 CARTRIDGE FUSES

A. Characteristics: NEMA FU 1, nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages.

PART 3 - EXECUTION

3.1 FUSE APPLICATIONS

A. Service Entrance: Class L, time delay.

B. Feeders: Class J, time delay.

C. Motor Branch Circuits: Class RK5, time delay.

D. Other Branch Circuits: Class J, fast acting.

E. Control Circuits: Class CC, fast acting.

3.2 INSTALLATION

A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.

3.3 IDENTIFICATION

A. Install labels complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems" and indicating fuse replacement information on inside door of each fused switch and adjacent to each fuse block and holder.

END OF SECTION 26 28 13

SECTION 26 28 16
ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fusible switches.
2. Nonfusible switches.
3. Shunt trip switches.
4. Molded-case circuit breakers (MCCBs).
5. Enclosures.

1.2 DEFINITIONS

A. NC: Normally closed.

B. NO: Normally open.

C. SPDT: Single pole, double throw.

1.3 SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated.

B. Shop Drawings: For enclosed switches and circuit breakers. Include plans, elevations, sections, details, and attachments to other work.

1. Wiring Diagrams: For power, signal, and control wiring.

C. Field quality-control reports.

D. Operation and maintenance data.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 FUSIBLE SWITCHES

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

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. Siemens Energy & Automation, Inc.
3. Square D; a brand of Schneider Electric.

B. Type HD, Heavy Duty, Single Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate indicated fuses, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

C. Type HD, Heavy Duty, Six Pole, Single Throw, 600-V ac, 200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate indicated fuses, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

D. Type HD, Heavy Duty, Double Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate indicated fuses, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

E. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
4. Lugs: Suitable for number, size, and conductor material.
5. Service-Rated Switches: Labeled for use as service equipment.

2.2 NONFUSIBLE SWITCHES

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

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. Siemens Energy & Automation, Inc.
3. Square D; a brand of Schneider Electric.

B. Type HD, Heavy Duty, Single Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

C. Type HD, Heavy Duty, Six Pole, Single Throw, 600-V ac, 200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

D. Type HD, Heavy Duty, Double Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

E. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Lugs: Suitable for number, size, and conductor material.

2.3 SHUNT TRIP SWITCHES

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

1. Cooper Bussmann, Inc.
2. Ferraz Shawmut, Inc.
3. Littelfuse, Inc.

B. General Requirements: Comply with ASME A17.1, UL 50, and UL 98, with 200-kA interrupting and short-circuit current rating when fitted with Class J fuses.

C. Switches: Three-pole, horsepower rated, with integral shunt trip mechanism and Class J fuse block; lockable handle with capability to accept three padlocks; interlocked with cover in closed position.

D. Control Circuit: 120-V ac; obtained from integral control power transformer, with primary and secondary fuses, with a control power source of enough capacity to operate shunt trip, connected pilot, and indicating and control devices.

E. Accessories:

1. Oiltight key switch for key-to-test function.
2. Oiltight ON pilot light.
3. Isolated neutral lug.
4. Mechanically interlocked auxiliary contacts that change state when switch is opened and closed.
5. Form C alarm contacts that change state when switch is tripped.
6. Three-pole, double-throw, fire-safety and alarm relay; 120-V ac coil voltage.
7. Three-pole, double-throw, fire-alarm voltage monitoring relay complying with NFPA 72.

2.4 MOLDED-CASE CIRCUIT BREAKERS

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

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. Siemens Energy & Automation, Inc.
3. Square D; a brand of Schneider Electric.

B. General Requirements: Comply with UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents.

C. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

D. Electronic Trip Circuit Breakers: Field-replaceable rating plug, rms sensing, with the following field-adjustable settings:

1. Instantaneous trip.
2. Long- and short-time pickup levels.
3. Long- and short-time time adjustments.
4. Ground-fault pickup level, time delay, and I^2t response.

E. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller, and let-through ratings less than NEMA FU 1, RK-5.

F. Features and Accessories:

1. Standard frame sizes, trip ratings, and number of poles.
2. Lugs: Suitable for number, size, trip ratings, and conductor material.
3. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge lighting circuits.
4. Ground-Fault Protection: Comply with UL 1053; integrally mounted, self-powered type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero-sequence current transformer/sensor.
5. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.
6. Auxiliary Contacts: Two SPDT switches with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts, "b" contacts operate in reverse of circuit-breaker contacts.
7. Alarm Switch: One NC contact that operates only when circuit breaker has tripped.

2.5 ENCLOSURES

A. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.

1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
2. Outdoor Locations: NEMA 250, Type 3R.
3. Wash-Down Areas: NEMA 250,, stainless steel.
4. Other Wet or Damp, Indoor Locations: NEMA 250, Type 4.
5. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.

B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

C. Install fuses in fusible devices.

D. Comply with NECA 1.

3.2 IDENTIFICATION

A. Comply with requirements in Division 26 Section "Identification for Electrical Systems."

1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Acceptance Testing Preparation:

1. Test insulation resistance for each enclosed switch and circuit breaker, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

C. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

D. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports, including a certified report that identifies enclosed switches and circuit breakers and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

END OF SECTION 26 28 16

SECTION 26 43 13
SURGE PROTECTIVE DEVICES (SPD)

PART 1 - GENERAL

1.1 SUMMARY

A. Surge protective devices on power circuits at facility entrances to protect the structure from lightning.

B. Surge protective devices on signal, data, and control lines at facility entrances to protect the structure from lightning.

1.2 SUBMITTALS

A. Drawings: Electrical and mechanical drawings shall be provided by the manufacturer which show unit dimensions, weights, mounting provisions, connection notes, wire size and wiring diagram. The manufacturer shall furnish an installation manual with installation notes, start-up and operating instructions for the specified system. Installation instructions shall clearly state whether the system requires an external overcurrent protection device to maintain the system's UL 1449 listing.

B. Independent Testing:

1. High exposure with the 10 x 1,000• s tests per IEEE C62.41.2 Section 7.2.
2. Life Cycle/Repetitive Testing per C62.45-2002 section B.38 minimum of 2,000 times.

C. National Electrical Code (NEC) 285 - Installation requirements for SPD.

1. Article 285.2, SPD must limit transient voltage by diverting or limiting surge current; it also should prevent continued flow of follow current while remaining capable of repeating these functions. SPD that utilize fuses must have repetitive surge capability that can survive its surge rating and meet UL 1449.
2. Article 285.6, TVSS shall be marked with a short circuit current rating and shall not be installed at a point on the system (ex. service, distribution or branch panels) where the available fault current (AIC rating) is in excess of that rating.

D. UL 1449 stipulation for fused SPD - The manufacturer's authorized representative is required to submit the following:

1. Certify that the SPD is UL 1449 3rd edition listed (UL Card) with UL Card.
2. Indicate the type of internal or external fusing that is incorporated in the SPD and what impact the fusing has on the performance of the device with respect to surge capacity and clamping levels.

1.3 STANDARDS

A. Underwriters Laboratories 1449 - (UL 1449 3rd Edition)
Include Electromagnetic interference filter which provides noise attenuation.

B. National Electrical Code 2008 rev. - (NEC Article 285 SPD installation practice/NEC article 250.56 grounding)
NFPA-78 and CSA - (National Fire Protection Association and Canadian Standards Associations)
ISO 9001:2000 - quality standard
Military standards (mil-std 220B)

C. IEEE (Institute of Electrical and Electronic Engineering Inc.) C62.41.1 and c62.41.2 – 2002 rev. - (system shall be designed to meet c62.41)

1. IEEE C62.41.2-2002 section 7.2 long duration 10 x 1,000 • sec test to be compliant if the device exhibits less than 10% deviation from initial readings. Units must be tested to withstand and pass the 10 x 1,000 • sec test
2. IEEE C62.45 – 2002 rev. - (system shall be tested to meet the C62.45)
3. Category A & B - (0.5 • s x 100 kHz ring wave)
4. Category B3 bi-wave - (8 x 20 • s at 3,000 amperes and 1.2 x 50 • s at 6,000 volts)
5. Category C3 bi-wave - (8 x 20 • s at 10,000 amperes and 1.2 x 50 • s at 20,000 volts)

D. IEEE Std. 1100 (2005) “The Emerald Book” Section 8.4.2.5

E. The fusing elements must be capable of allowing the suppressor’s rated single impulse current to pass through the suppressor at least one time without failure. The system shall be tested to 1,000 sequential per C62.45-2002 section b.38 referencing C62.41.1 and C62.41.2 category c3 combination wave transients. The category c3 combination wave is defined as a 1.2 x 50 microsecond wave at 20,000 volt open circuit voltage waveform and 8 x 20 microsecond wave at 10,000 ampere short circuit current waveform. In addition, the system components shall be tested repetitively 1,000 times testing based on an IEEE c62.33 (MOV test) and c62.35 (sad test) without failure or degradation exceeding ±10%.

F. CBEMA (ITIC) and IEC - (Computer Business Equipment Manufacturers Association or Information Technology Industry Council and International Electrotechnical Commission define clamping voltage tolerance guidelines for sensitive equipment).

G. UL 1449 3rd Edition Voltage Protection Rating (VPR) is assigned to each mode of protection using a combination wave generator at a setting of 6kV, 3kA. SPD shall have a Nominal Discharge Current rating (I_n) of 10kA or 20kA.

H. All manufacturers must comply with above listed standards and any additions current revisions of industry standards. All products that do not comply with current industry standards will not be accepted.

1.4 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of surge suppressors that fails in materials or workmanship within specified warranty period.

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

1.5 RECEIVING, STORING AND PROTECTING

A. Receive, store, protect, and handle products according to NECA 1 *Standard Practices for Good Workmanship in Electrical Construction*.

PART 2 - PRODUCTS

2.1 BRANCH PANEL SUPPRESSORS

A. Acceptable Manufacturers and Models:

1. Current Technology – CGP060
2. LEA International Inc. –SP100
3. Liebert – ACV-111-RKE

No other Manufacturers will be accepted.

B. Device shall meet all specification requirements in section 2.1 except as follows:

1. Equipment shall be a multi-stage parallel protector. Provide voltage configuration as required per contract documents. The equipment's minimum surge current capacity shall be 100kA per phase (L-N plus L-G) and 50kA per mode (L-N, L-G, L-L and N-G).
2. The system protection shall contain a technology that utilizes a symmetrical array of balanced metal oxide varistors (MOV). Each MOV will be individually coordinated to pass UL 1449. The unit shall be non-modular type.
3. Equipment shall provide the following monitoring features: dry contacts and audible alarm with alarm disable switch. Equipment shall utilize a NEMA 4X enclosure.

2.2 ENCLOSURES

A. Indoor Enclosures: NEMA 250 Type 12.

B. Outdoor Enclosures: NEMA 250 Type 4X.

2.3 SURGE PROTECTIVE DEVICES FOR SIGNAL, DATA, AND CONTROL LINES

A. Provide surge protective devices suitable for the protection of signal, data, antenna, and control lines.

1. Select surge protective devices with consideration for aspects such as the frequency, bandwidth, voltage, and current of the signal, data, antenna, or other communications lines and to ensure that insertion losses introduced by the surge protective devices are within acceptable operational limits.
2. Coordinate selection of surge protective devices for signal, data, antenna, and control lines with owner of equipment that is served by the lines.

B. Provide surge protective devices for of signal, data, and control lines that provide both common mode and differential mode protection.

C. Provide surge protective devices for signal, data, control, and alarm lines.

1. Devices shall be listed in accordance with UL 497B Standard for Safety Protectors for Data Communications and Fire Alarm Circuits.
2. Provide devices with ratings and connectors as required by the application.
3. Manufacturer: Transtector Systems, EDCO, MCG Electronics

D. Provide coaxial surge protective devices for antenna and RF signal lines.

1. Devices shall be listed in accordance with UL 497C Standard for Safety Protectors for Coaxial Communications Circuits.
2. Provide devices with ratings and connectors as required by the application.
3. Provide bulkhead plates and low-impedance paths to ground where antenna cables enter the structure.
4. Manufacturers: TII Network Technologies, Inc, Cable Innovations, PolyPhaser.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify mounting area is ready for equipment. Allow adequate clearances for maintenance.

B. Verify that circuit rough-in is at correct location.

3.2 INSTALLATION

A. Install surge protective devices externally mounted to the service entrance, distribution and branch panelboards, as stand-alone units. Internal products will not be accepted.

B. Install surge protective devices where indicated on the Drawings and according to manufacturer's instructions and the *National Electrical Code*. SPD shall be installed with the shortest lead length possible not to exceed five (5') feet for service entrance and distribution and one foot and half (1.5') for branch panelboards from the power conductor(s) it is protecting. Have the manufacturer's installation instructions available at the construction site.

C. Install surge protective device in the service equipment to protect each ungrounded conductor on the line side of the service entrance disconnecting means.

D. Install surge protective device to protect each ungrounded conductor of power circuits that exits the structure to serve external detached equipment or other detached structures. Where such power circuits are longer than 100 ft install surge protective devices to protect each ungrounded conductor at both ends of the circuit.

E. Install UL 497B listed surge protective device for each for signal, data, control, and alarm line that enters the structure or exits the structure to serve external detached equipment or other detached structures. Where such signal, data, control, and alarm circuits are longer than 100 ft install UL 497B listed surge protective device at both ends of the circuit.

F. Install each surge protective device so it will be accessible for inspection and maintenance and so the condition monitoring indicator will be visible without requiring the removal of cover plates.

G. Install each surge protective device with minimum possible conductor length and a maximum conductor length of 18 inches.

1. Twist conductors tightly together and keep runs as straight as possible with no sharp bends or kinks.
2. Use approved means to make connections from the surge protective device to conductors to be protected.

H. Provide low-impedance grounding for surge protective devices.

1. Use approved means to make connections from the surge protective device to the point where the electrical power system grounded conductor is bonded to the grounding electrode conductor.
2. If the surge protective device is more than 20 ft away from the electrical system bonding point, make one or more supplementary grounding electrode connections at the surge protective device location. Use the building “main grounding electrode ground bar”, “main grounding electrode ground bar extensions”, effectively grounded building structural steel, and grounded water pipes as supplementary grounding electrodes.
3. Do not use a lightning protection system down conductor to ground a surge protective device.

3.3 Field Quality Control

A. Provide final protection and maintain conditions to ensure that coatings and finishes are without damage or deterioration at final inspection.

B. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.

C. Repair damage to paint finishes with matching touch-up coating recommended by the manufacturer.

D. Verify that each surge protective device is correctly connected and that all condition monitoring indicators operate properly.

3.4 STARTUP SERVICE

A. Do not energize or connect service entrance equipment and panelboards to their sources until SPD are installed and connected.

B. Do not perform insulation resistance tests of the distribution wiring equipment with the SPD installed. Disconnect before conducting insulation resistance tests, and reconnect immediately after the testing is over.

END OF SECTION 26 43 13

SECTION 26 56 00
EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exterior luminaires with lamps and ballasts.
2. Luminaire-mounted photoelectric relays.
3. Poles and accessories.

1.2 STRUCTURAL ANALYSIS CRITERIA FOR POLE SELECTION

A. Dead Load: Weight of luminaire and its horizontal and vertical supports, lowering devices, and supporting structure, applied as stated in AASHTO LTS-4-M.

B. Live Load: Single load of 500 lbf, distributed as stated in AASHTO LTS-4-M.

C. Ice Load: Load of 3 lbf/sq. ft., applied as stated in AASHTO LTS-4-M Ice Load Map.

D. Wind Load: Pressure of wind on pole and luminaire and banners and banner arms, calculated and applied as stated in AASHTO LTS-4-M.

1. Basic wind speed for calculating wind load for poles 50 feet high or less is 130 mph.

a. Wind Importance Factor: 1.15.
b. Minimum Design Life: 25 years.
c. Velocity Conversion Factors: 1.0.

1.3 ACTION SUBMITTALS

A. Product Data: For each luminaire, pole, and support component, arranged in order of lighting unit designation. Include data on features, accessories, and finishes.

B. Shop Drawings: Anchor-bolt templates keyed to specific poles and certified by manufacturer.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with IEEE C2, "National Electrical Safety Code."

C. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, product(s) indicated on Drawings.

2.2 GENERAL REQUIREMENTS FOR LUMINAIRES

A. Luminaires shall comply with UL 1598 and be listed and labeled for installation in wet locations by an NRTL acceptable to authorities having jurisdiction.

1. LER Tests Incandescent Fixtures: Where LER is specified, test according to NEMA LE 5A.
2. LER Tests HID Fixtures: Where LER is specified, test according to NEMA LE 5B.

B. Lateral Light Distribution Patterns: Comply with IESNA RP-8 for parameters of lateral light distribution patterns indicated for luminaires.

C. Metal Parts: Free of burrs and sharp corners and edges.

D. Sheet Metal Components: Corrosion-resistant aluminum unless otherwise indicated. Form and support to prevent warping and sagging.

E. Housings: Rigidly formed, weather- and light-tight enclosures that will not warp, sag, or deform in use. Provide filter/breather for enclosed luminaires.

F. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position. Doors shall be removable for cleaning or replacing lenses. Designed to disconnect ballast when door opens.

G. Exposed Hardware Material: Stainless steel.

H. Plastic Parts: High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.

I. Light Shields: Metal baffles, factory installed and field adjustable, arranged to block light distribution to indicated portion of normally illuminated area or field.

J. Reflecting surfaces shall have minimum reflectance as follows unless otherwise indicated:

1. White Surfaces: 85 percent.
2. Specular Surfaces: 83 percent.
3. Diffusing Specular Surfaces: 75 percent.

K. Lenses and Refractors Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.

L. Luminaire Finish: Manufacturer's standard paint applied to factory-assembled and -tested luminaire before shipping. Where indicated, match finish process and color of pole or support materials.

M. Factory-Applied Finish for Steel Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

1. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning," to remove dirt, oil, grease, and other contaminants that could impair paint bond. Grind welds and polish surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or SSPC-SP 8, "Pickling."
2. Exterior Surfaces: Manufacturer's standard finish consisting of one or more coats of primer and two finish coats of high-gloss, high-build polyurethane enamel.

    a. Color: As selected from manufacturer's standard catalog of colors.

N. Factory-Applied Finish for Aluminum Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
2. Natural Satin Finish: Provide fine, directional, medium satin polish (AA-M32); buff complying with AA-M20; and seal aluminum surfaces with clear, hard-coat wax.
3. Class I, Clear Anodic Finish: AA-M32C22A41 (Mechanical Finish: medium satin; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.
4. Class I, Color Anodic Finish: AA-M32C22A42/A44 (Mechanical Finish: medium satin; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.

O. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps and ballasts. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.

1. Label shall include the following lamp and ballast characteristics:

    a. "USES ONLY" and include specific lamp type.
    b. Lamp tube configuration (twin, quad, triple), base type, and nominal wattage for compact fluorescent luminaires.
    c. Lamp type, wattage, bulb type (ED17, BD56, etc.) and coating (clear or coated) for HID luminaires.
    d. Start type (preheat, rapid start, instant start) compact fluorescent luminaires.
    e. ANSI ballast type (M98, M57, etc.) for HID luminaires.
    f. CCT and CRI for all luminaires.

2.3 BALLASTS FOR HID LAMPS

A. Comply with ANSI C82.4 and UL 1029 and capable of open-circuit operation without reduction of average lamp life. Include the following features unless otherwise indicated:

1. Ballast Circuit: Constant-wattage autotransformer or regulating high-power-factor type.

2. Minimum Starting Temperature: Minus 22 deg F.
3. Normal Ambient Operating Temperature: 104 deg F.
4. Ballast Fuses: One in each ungrounded power supply conductor. Voltage and current ratings as recommended by ballast manufacturer.

2.4 HID LAMPS

A. Metal-Halide Lamps: ANSI C78.43, with minimum CRI 65, and CCT color temperature 4000 K.

B. Pulse-Start, Metal-Halide Lamps: Minimum CRI 65, and CCT color temperature 4000 K.

2.5 GENERAL REQUIREMENTS FOR POLES AND SUPPORT COMPONENTS

A. Structural Characteristics: Comply with AASHTO LTS-4-M.

1. Wind-Load Strength of Poles: Adequate at indicated heights above grade without failure, permanent deflection, or whipping in steady winds of speed indicated in "Structural Analysis Criteria for Pole Selection" Article.
2. Strength Analysis: For each pole, multiply the actual equivalent projected area of luminaires and brackets by a factor of 1.1 to obtain the equivalent projected area to be used in pole selection strength analysis.

B. Luminaire Attachment Provisions: Comply with luminaire manufacturers' mounting requirements. Use stainless-steel fasteners and mounting bolts unless otherwise indicated.

C. Mountings, Fasteners, and Appurtenances: Corrosion-resistant items compatible with support components.

1. Materials: Shall not cause galvanic action at contact points.
2. Anchor Bolts, Leveling Nuts, Bolt Caps, and Washers: Hot-dip galvanized after fabrication unless otherwise indicated.
3. Anchor-Bolt Template: Plywood or steel.

D. Handhole: Oval-shaped, with minimum clear opening of 2-1/2 by 5 inches, with cover secured by stainless-steel captive screws. Provide on all, except wood poles.

E. Concrete Pole Foundations: Cast in place, with anchor bolts to match pole-base flange. Concrete, reinforcement, and formwork are specified in Section 033000 "Cast-in-Place Concrete."

F. Power-Installed Screw Foundations: Factory fabricated by pole manufacturer, with structural steel complying with ASTM A 36/A 36M and hot-dip galvanized according to ASTM A 123/A 123M; and with top-plate and mounting bolts to match pole base flange and strength required to support pole, luminaire, and accessories.

G. Breakaway Supports: Frangible breakaway supports, tested by an independent testing agency acceptable to authorities having jurisdiction, according to AASHTO LTS-4-M.

PART 3 - EXECUTION

3.1 LUMINAIRE INSTALLATION

A. Install lamps in each luminaire.

B. Fasten luminaire to indicated structural supports.

1. Use fastening methods and materials selected to resist seismic forces defined for the application and approved by manufacturer.

C. Adjust luminaires that require field adjustment or aiming. Include adjustment of photoelectric device to prevent false operation of relay by artificial light sources, favoring a north orientation.

3.2 POLE INSTALLATION

A. Alignment: Align pole foundations and poles for optimum directional alignment of luminaires and their mounting provisions on the pole.

B. Clearances: Maintain the following minimum horizontal distances of poles from surface and underground features unless otherwise indicated on Drawings:

1. Fire Hydrants and Storm Drainage Piping: 60 inches.
2. Water, Gas, Electric, Communication, and Sewer Lines: 5 feet.
3. Trees: 15 feet from tree trunk.

C. Embedded Poles with Tamped Earth Backfill: Set poles to depth below finished grade indicated on Drawings, but not less than one-sixth of pole height.

1. Dig holes large enough to permit use of tampers in the full depth of hole.
2. Backfill in 6-inch layers and thoroughly tamp each layer so compaction of backfill is equal to or greater than that of undisturbed earth.

D. Embedded Poles with Concrete Backfill: Set poles in augered holes to depth below finished grade indicated on Drawings, but not less than one-sixth of pole height.

1. Make holes 6 inches in diameter larger than pole diameter.
2. Fill augered hole around pole with air-entrained concrete having a minimum compressive strength of 3000 psi at 28 days, and finish in a dome above finished grade.
3. Use a short piece of 1/2-inch- diameter pipe to make a drain hole through concrete dome. Arrange to drain condensation from interior of pole.
4. Cure concrete a minimum of 72 hours before performing work on pole.

E. Raise and set poles using web fabric slings (not chain or cable).

3.3 CORROSION PREVENTION

A. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum by insulating fittings or treatment.

B. Steel Conduits: Comply with Section 260533 "Raceways and Boxes for Electrical Systems." In concrete foundations, wrap conduit with 0.010-inch- thick, pipe-wrapping plastic tape applied with a 50 percent overlap.

3.4 GROUNDING

A. Ground metal poles and support structures according to Section 260526 "Grounding and Bonding for Electrical Systems."

1. Install grounding electrode for each pole unless otherwise indicated.
2. Install grounding conductor pigtail in the base for connecting luminaire to grounding system.

B. Ground nonmetallic poles and support structures according to Section 260526 "Grounding and Bonding for Electrical Systems."

1. Install grounding electrode for each pole.
2. Install grounding conductor and conductor protector.
3. Ground metallic components of pole accessories and foundations.

END OF SECTION 26 56 00

Division 32

Exterior Improvements

SECTION 32 31 00
FENCES AND GATES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Galvanized-steel chain link fabric.
2. Galvanized-steel framework.
3. Gate operator.

B. Related Work Specified Elsewhere

1. Division 26 Sections for electric power for electric gate operators.

1.2 SUBMITTALS

A. Submit in accordance with Division 01 requirements.

B. Product data in the form of manufacturer's technical data, specifications, and installation instructions for fence and gate posts, fabric, gates, gate operators, and accessories.

C. Shop drawings showing location of fence, gates, each post, and details of post installation, extension arms, gate swing, hardware, and accessories.

D. Wiring diagrams from manufacturer for electrically operated gates.

E. Submit complete and detailed shop drawings for all fences and gates. Show heights, materials and gauges, connection details, installation instructions, post anchoring details, and all miscellaneous details and conditions. Shop drawings shall be prepared to scale and indicate all appurtenances and details of the fencing and construction.

F. Submit manufacturer’s product data including maintenance instructions and warranties.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has at least three years' experience and has completed at least five chain link fence projects with same material and of similar scope to that indicated for this Project with a successful construction record of in-service performance.

B. Single-Source Responsibility: Obtain chain link fences and gates, including accessories, fittings, and fastenings, from a single source.

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver chain link fencing fabric and all components to the project site in protected condition.

B. Store undercover as directed by the chain link manufacturer.

1.5 PROJECT CONDITIONS

C. Field Measurements: Verify layout information for fences and gates shown on the Drawings in relation to the property survey and existing structures. Verify dimensions by field measurements.

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

1. Notify Architect not less than 2 days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Architect's written permission.

PART 2 - PRODUCTS

2.1 FABRIC

A. Selvage: Knuckled on both selvages.

B. Steel Chain-Link Fence Fabric: Fabricated in one-piece widths for fencing 12 feet and less in height to comply with Chain Link Fence Manufacturers Institute (CLFMI) "Product Manual" and with requirements indicated below:

1. Mesh and Wire Size: 2-inch mesh, 0.148-inch diameter (9 gage).
2. Coating: ASTM A 817, Type 2, Class 1, zinc-coated (galvanized) applied after weaving.

2.2 FRAMING

A. Comply with the 2007 Florida Building Code with the 2009 Supplement. Increase sizes of line and corner posts as may be required to meet wind loading.

B. Round member sizes are given in actual outside diameter (OD) to the nearest thousandth of inches. Round fence posts and rails are often referred to in ASTM standard specifications by nominal pipe sizes (NPS) or the equivalent trade sizes in inches. The following indicates these equivalents all measured in inches:

Actual OD	NPS Size	Trade Size
1.315	1	1-3/8
1.660	1-1/4	1-5/8
1.900	1-1/2	2
2.375	2	2-1/2
2.875	2-1/2	3
3.500	3	3-1/2
4.000	3-1/2	4
6.625	6	6-5/8
8.625	8	8-5/8

C. Type I Round Posts: Standard weight (schedule 40) galvanized-steel pipe conforming to ASTM F 1083, according to heavy industrial requirements of ASTM F 1043, Group IA, with minimum yield strength of 25,000 psi, not less than 1.8 oz. of zinc per sq. ft. Type A coating inside and outside according to ASTM F 1234, as determined by ASTM A 90, and weights per foot as follows:

Actual OD	Weight (lb/ft)	NPS Size
1.315	1.68	1
1.660	2.27	1-1/4
1.900	2.72	1-1/2
2.375	3.65	2
2.875	5.79	2-1/2
3.500	7.58	3
4.000	9.11	3-1/2
6.625	8.97	6
8.625	28.55	8

D. Top Rail: Manufacturer's longest lengths (17 to 21 feet) with swaged-end or expansion-type coupling, approximately 6 inches long for joining. Provide rail ends or other means for attaching top rail securely to each gate corner, pull, and end post.

1. Round Steel: 1.660-inch OD Type I or II steel pipe.

E. Steel posts for fabric heights up to 6 feet:

1. Round Line or Intermediate Posts: 2.375-inch OD Type I or II steel pipe.
2. Corner Posts: 3.50-inch OD Type I or II steel pipe.

F. Steel posts for fabric heights over 6 feet:

1. Round Line or Intermediate Posts: 2.875-inch OD Type I or II steel pipe.
2. Corner Posts: 4.00-inch OD Type I or II steel pipe.

G. Swing Gate Posts: Furnish posts to support single gate leaf, or one leaf of a double-gate installation, according to ASTM F 900, sized as follows for steel and aluminum pipe posts:

1. Steel posts for fabric height of 6 feet or less and gate leaf width:

a. Up to and Including 4 Feet: 2.375-inch OD pipe weighing at least 3.11 lb per ft.
b. Over 4 to 10 Feet: 2.875-inch OD pipe weighing at least 4.64 lb per ft.
c. Over 10 to 18 Feet: 4.000-inch OD pipe weighing at least 8.65 lb per ft.

2. Steel posts for fabric height over 6 feet and gate leaf width:

a. Up to and Including 6 Feet: 2.875-inch OD pipe weighing at least 4.64 lb per ft.
b. Over 6 to 12 Feet: 4.000-inch OD pipe weighing at least 8.65 lb per ft.
c. Over 12 to 18 Feet: 6.625-inch OD pipe weighing at least 10.02 lb per ft.
d. Over 18 to 24 Feet: 8.625 OD pipe weighing at least 27.12 lb per ft.

H. Horizontal Slide Gate Posts: Provide steel pipe gate posts sized as follows, according to ASTM F 1184, for Type II, cantilever slide gates:

1. Opening Width Up to 12 feet: 3.500-inch OD pipe weighing not less than 4.64 lb per ft.
2. Opening Width Over 12 feet: 6.625-inch OD pipe weighing not less than 6.56 lb per ft.

2.3 FITTINGS AND ACCESSORIES

A. Material: Comply with ASTM F 626. Mill-finished aluminum or galvanized iron or steel to suit manufacturer's standards.

1. Steel and Iron: Unless specified otherwise, hot-dip galvanize pressed steel or cast-iron fence fittings and accessories with at least 1.2 oz. zinc per sq. ft. as determined by ASTM A 90.

B. Post and Line Caps: Provide weathertight closure cap for each post. Provide line post caps with loop to receive tension wire or top rail.

C. Post Brace Assembly: Manufacturer's standard adjustable brace. Use material specified below for brace, and truss to line posts with 3/8-inch-diameter rod and adjustable tightener. Provide manufacturer's standard galvanized-steel, cast-iron or cast-aluminum cap for each end.

1. Round Steel: 1.900-inch OD Type I or II steel pipe.

D. Bottom and Center Rail: Same material as top rail. Provide manufacturer's standard galvanized-steel, cast-iron or cast-aluminum cap for each end.

E. Tie Wires: 0.106-inch-diameter (12-gage) galvanized steel with a minimum of 0.80 oz. per sq. ft. of zinc coating according to ASTM A 641, Class 3 or 0.148-inch-diameter (9-gage) aluminum wire alloy 1350-H19 or equal, to match fabric wire.

2.4 CONCRETE

A. Concrete: Provide concrete consisting of portland cement per ASTM C 150, aggregates per ASTM C 33, and potable water. Mix materials to obtain concrete with a minimum 28-day compressive strength of 3000 psi. Use at least four sacks of cement per cu. yd., 1-inch maximum size aggregate, 3-inch maximum slump.

B. Packaged Concrete Mix: Mix dry-packaged normal-weight concrete conforming to ASTM C 387 with clean water to obtain a 2- to 3-inch slump.

2.5 GATES

A.. Fabricate perimeter frames of gates from same material and finish as fence framework. Assemble gate frames by welding. Provide horizontal and vertical members to ensure proper gate operation and attachment of fabric, hardware, and accessories. Space frame members maximum of 8 feet apart unless otherwise indicated.

1. Fabric: Same as for fence unless otherwise indicated. Secure fabric at vertical edges with tension bars and bands and to top and bottom of frame with tie wires.
2. Bracing: Install diagonal cross-bracing consisting of 5/16-inch-diameter adjustable-length truss rods on gates to ensure frame rigidity without sag or twist.

B. Swing Gates: Comply with ASTM F 900.

1. Steel: Gates up to 8 feet wide:

a. Up to 6 Feet High: Fabricate perimeter frames of 1.660-inch minimum OD Type I or II steel pipe or 1-1/2-inch-square galvanized-steel tubing weighing 1.84 lb per sq. ft.
b. Over 6 Feet High: Fabricate perimeter frames of 1.90-inch minimum OD Type I or II steel pipe or 2-inch-square galvanized-steel tubing weighing 2.52 lb per sq. ft.

2. Gate Hardware: Provide galvanized hardware and accessories for each gate according to the following:

c. Hinges: Size and material to suit gate size, non-lift-off type, offset to permit 180-degree gate opening. Provide 1-1/2 pair of hinges for each leaf over 6-foot nominal height.
d. Latch: Forked type or plunger-bar type to permit operation from either side of gate, with padlock eye as an integral part of latch.
e. Keeper: Provide a keeper for vehicle gates that automatically engages gate leaf and holds it in the open position until manually released.
f. Gate Stops: Provide gate stops for double gates consisting of mushroom-type flush plate with anchors, set in concrete, and designed to engage a center drop rod or plunger bar. Include a locking device and padlock eyes as an integral part of the latch, permitting both gate leaves to be locked with a single padlock.

C. Sliding Gates: Comply with ASTM F 1184.

1. Type II, Cantilever: Manufacturer's standard top rail gate incorporating a track for the top roller. Brace frame to prevent sagging and apply fabric to entire gate. Provide a lockable positive latch and other hardware and accessories as required.

a. Class 1: Provide external rollers with accessible grease fittings, a safety enclosure, and guide posts to keep the gate on the rollers.

2.6 GATE OPERATOR

A. General: Manufacturer's standard design and construction, suitable for gates specified. Select operator size and features according to manufacturer's published data, taking into consideration size, type, weight, and construction of gate, as well as Project conditions and specified requirements.

B. Type: Electric motor with enclosed gear reducer and chain drive.

C. Speed: Minimum 45 feet per minute.

D. Features: Continuous duty without overloading or overheating. Rated by manufacturer at 30 or more complete cycles per hour. All components UL approved. Furnish disconnect switch with NEMA KS 1; Type 3R enclosure.

1. Provide equipment with suitable electrical characteristics including phase, voltage, branch circuit wire size, overcurrent protection, and connection devices coordinated with Division 26.
2. Self-locking.
3. Weather-resistant steel enclosure protecting all operating parts.
4. Automatic reversing upon obstruction during closing cycle and automatic stop upon obstruction during opening cycle.

E. Controls: Electric and electronic programmable controls separated from motor and drive mechanism, sealed from water and insects, with space for additional optional equipment. Provide adjustable automatic closing timer and the following remote control device:

1. Key switch with locked-in positions.

F. Coordinate with Division 26, Electrical.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install fence to comply with ASTM F 567. Do not begin installation and erection before final grading is completed, unless otherwise permitted.

1. Apply fabric to outside of framework. Install fencing on boundary lines inside of property line established by survey as required by Division 1.

B. Excavation: Drill or hand-excavate (using post-hole digger) holes for posts to diameters and spacings indicated, in firm, undisturbed or compacted soil.

2. If not indicated on Drawings, excavate holes for each post to minimum diameter recommended by fence manufacturer, but not less than four times the largest cross section of post.

3. Unless otherwise indicated, excavate hole depths approximately 3 inches lower than post bottom, with bottom of posts set not less than 36 inches below finish grade surface.

B. Setting Posts: Center and align posts in holes 3 inches above bottom of excavation. Space a maximum of 10 feet o.c., unless otherwise indicated.

1. Protect portion of posts above ground from concrete splatter. Place concrete around posts and vibrate or tamp for consolidation. Check each post for vertical and top alignment, and hold in position during placement and finishing operations.

a. Unless otherwise indicated, extend concrete footings 2 inches above grade and trowel to a crown to shed water.

C. Top Rails: Run rail continuously through line post caps, bending to radius for curved runs and at other posts terminating into rail end attached to posts or post caps fabricated to receive rail. Provide expansion couplings as recommended by fencing manufacturer.

D. Center Rails: Install center rails in one piece between posts and flush with post on fabric side, using rail ends and special offset fittings where necessary.

E. Brace Assemblies: Install braces at end and gate posts and at both sides of corner and pull posts. Locate horizontal braces at midheight of fabric on fences with top rail and at two thirds fabric height on fences without top rail. Install so posts are plumb when diagonal rod is under proper tension.

H. Fabric: Leave approximately 2 inches between finish grade and bottom selvage unless otherwise indicated. Pull fabric taut and tie to posts, rails, and tension wires. Install fabric on security side of fence, and anchor to framework so that fabric remains under tension after pulling force is released.

I. Tension or Stretcher Bars: Thread through fabric and secure to end, corner, pull, and gate posts with tension bands spaced not over 15 inches o.c.

J. Tie Wires: Use wire of proper length to secure fabric firmly to posts and rails. Bend ends of wire to minimize hazard to persons or clothing.

1. Maximum Spacing: Tie fabric to line posts 12 inches o.c. and to rails and braces 24 inches o.c.

K. Fasteners: Install nuts for tension bands and carriage bolts on the side of the fence opposite the fabric side. Peen ends of bolts or score threads to prevent removal of nuts for added security.

3.2 GATE INSTALLATION

A. Install gates plumb, level, and secure for full opening without interference. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary. Install gates according to manufacturer's instructions, plumb, level, and secure.

3.3 GATE OPERATOR INSTALLATION

A. Install gate operators according to manufacturer's instructions. Adjust for smooth, trouble-free operation.

B. Advise and consult with the Architect to obtain the Owner's requirements for standard available programmable features or adjustable controls (such as time delays, interlocks, or safety devices), and make necessary adjustments.

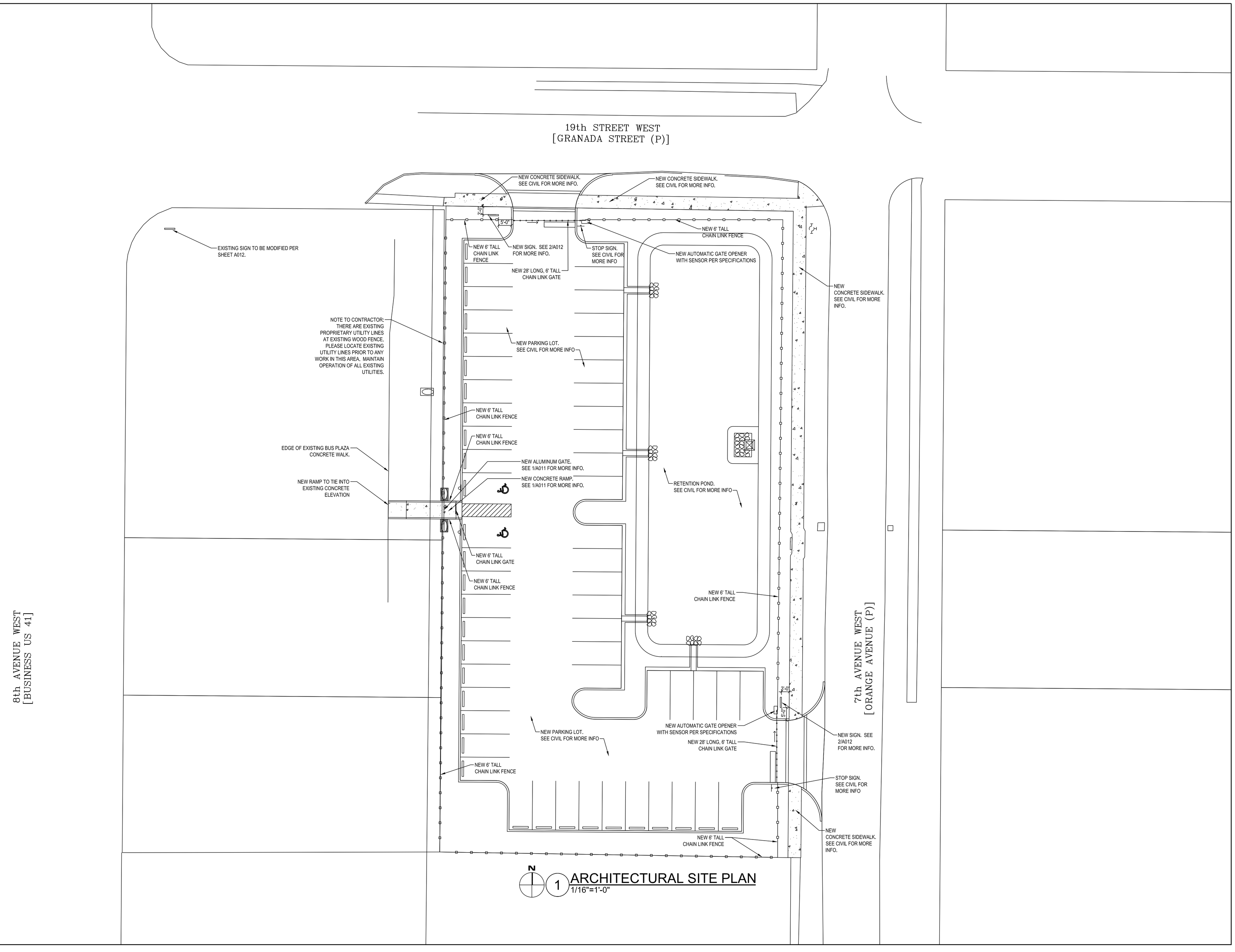
3.4 ADJUSTING

A. Gates and Gate Operators: After repeated operation of completed installation equivalent to 3 days' use by normal traffic, readjust gates and gate operators and controls for optimum operating condition and safety. Lubricate operating equipment and clean exposed surfaces.

3.5 DEMONSTRATION

A. Instruct the Owner's personnel on proper operation and maintenance of gate operators.

END OF SECTION 32 31 00



1 ARCHITECTURAL SITE PLAN
1/16"=1'-0"

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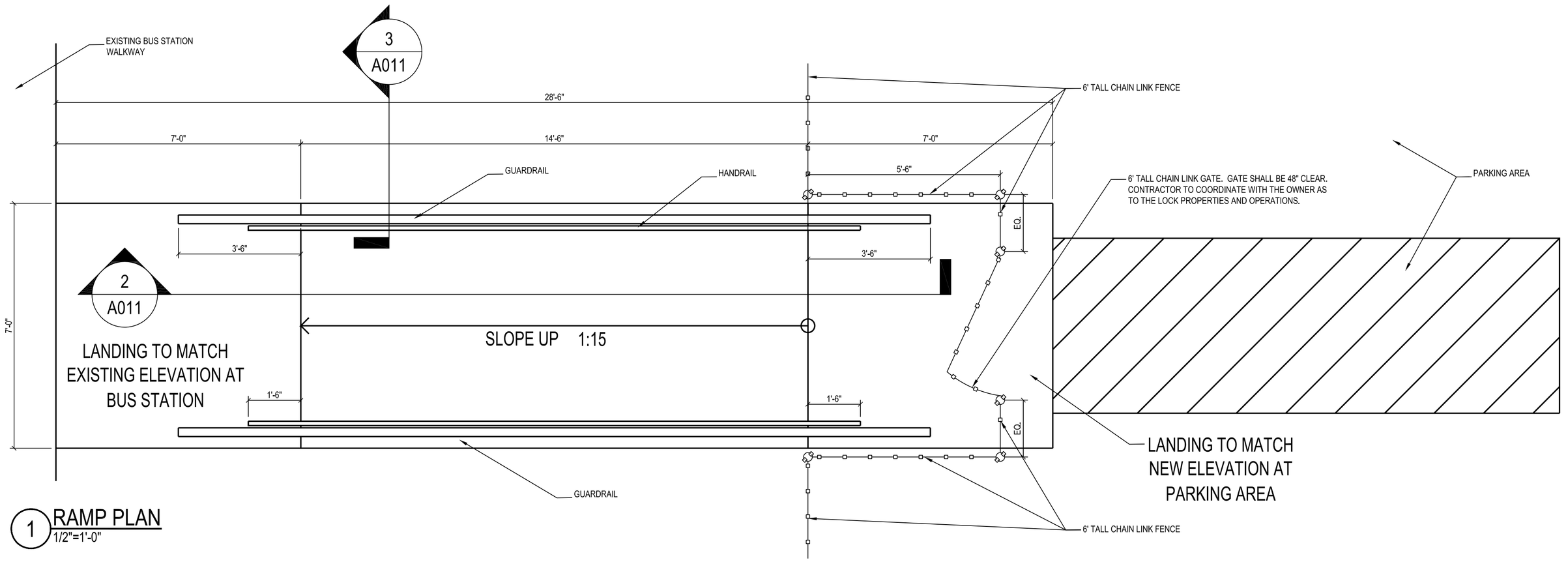
Bradenton, FL 34208

drawn: DA
checked: DA
date: 10.08.2010
comm. no.: 1020805

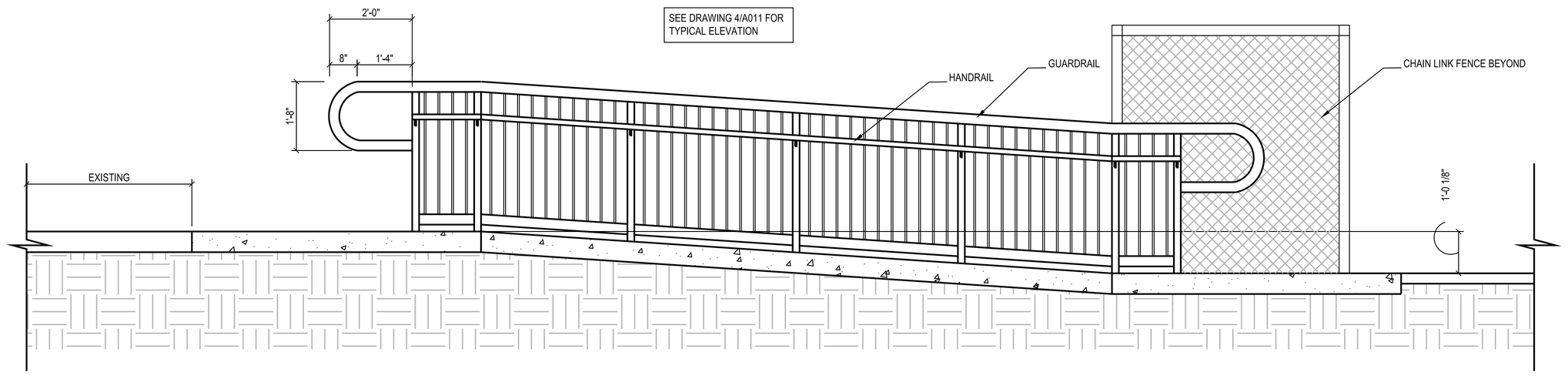
ARCHITECTURAL SITE PLAN

A010

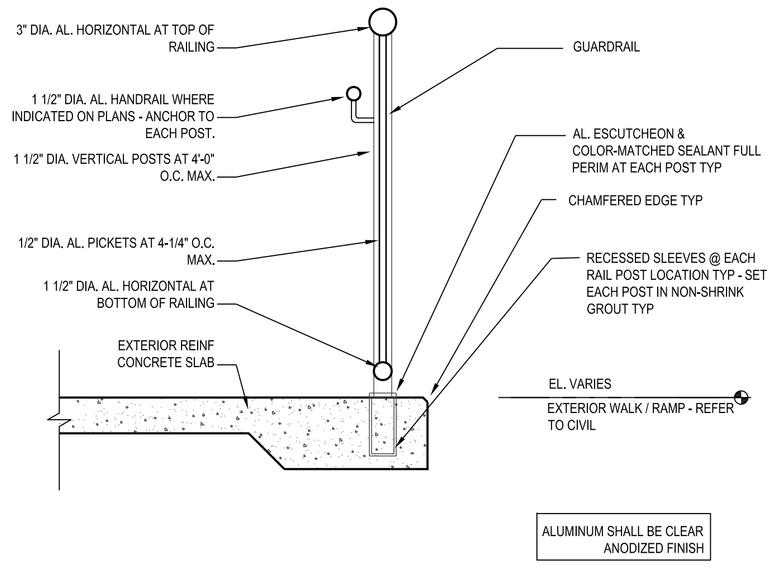
100% Construction Documents



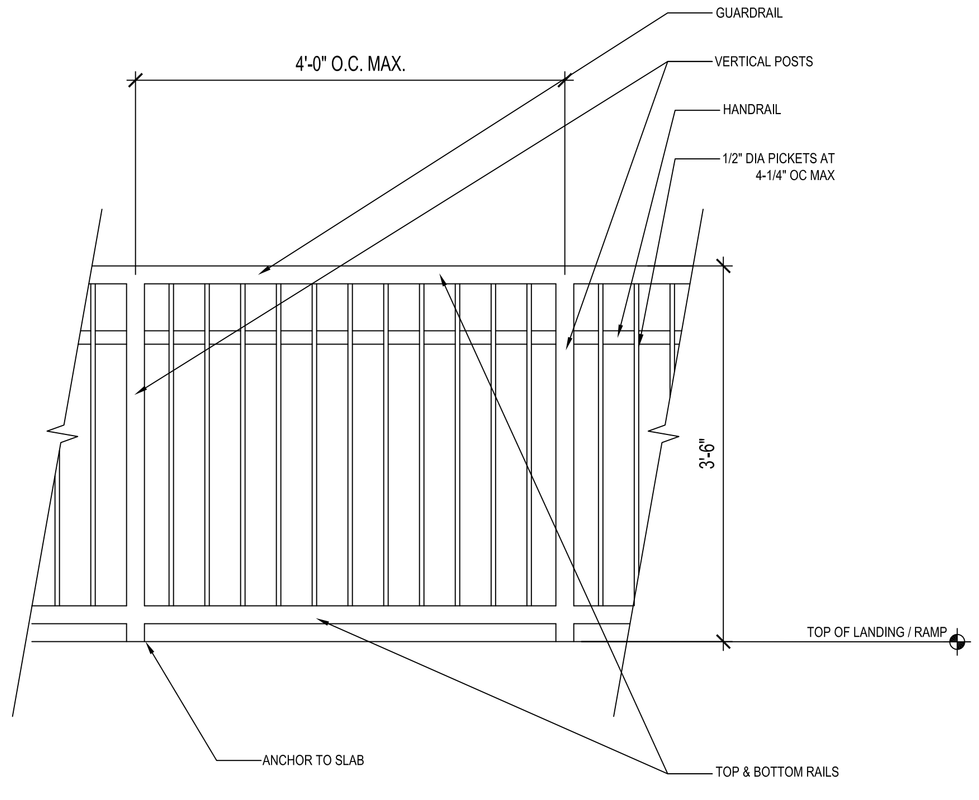
1 RAMP PLAN
1/2"=1'-0"



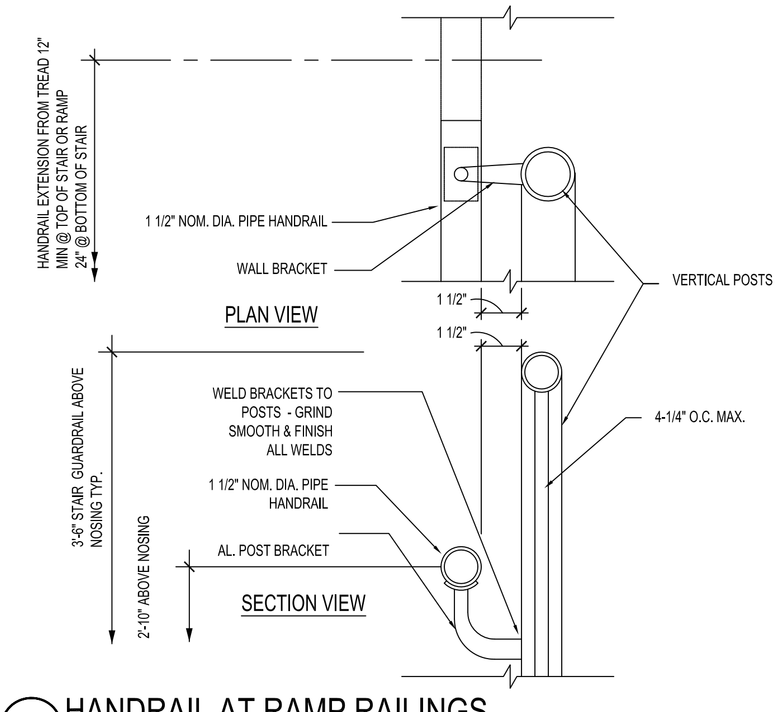
2 RAMP SECTION
1/2"=1'-0"



3 TYPICAL GUARDRAIL/HANDRAIL SECTION
1"=1'-0"



4 TYPICAL GUARDRAIL/HANDRAIL ELEVATION
1"=1'-0"



5 HANDRAIL AT RAMP RAILINGS
3"=1'-0"

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ARCHITECTURAL SITE PLAN & DETAILS

A011

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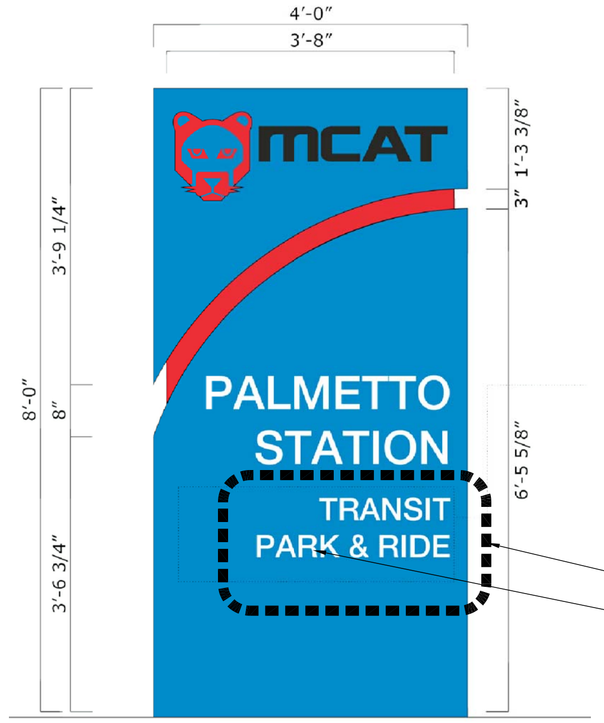


REFURBISH EXISTING DOUBLE FACES ILLUMINATED PYLON SIGN.

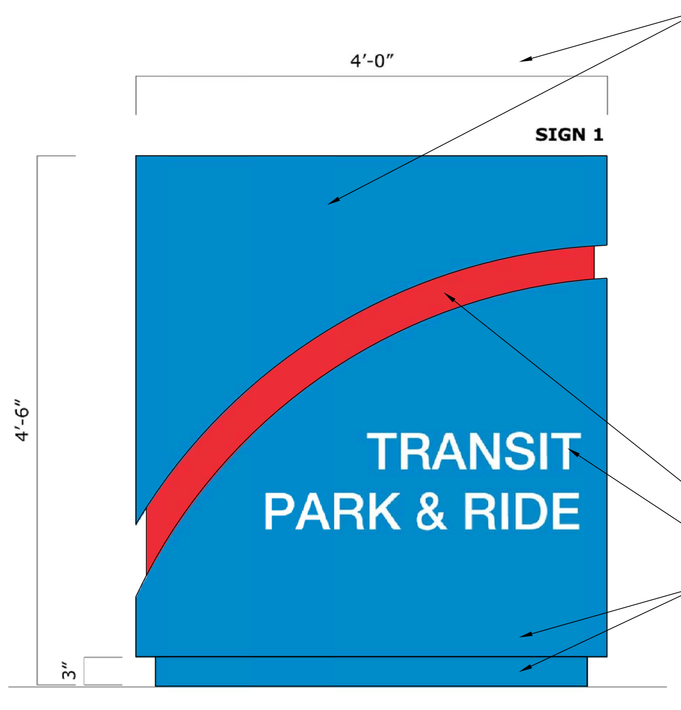
ADD NEW 3M REFLECTIVE VINYL COPY TO BOTH FACES OF EXISTING D/F PYLON SIGN IN FIELD TO MATCH EXISTING "PALMETTO STATION" COPY.

COLOR SCHEDULE:

PT 3
3M VINYL #680-10 WHITE REFLECTIVE

NOTE: SEE SPECIFICATIONS FOR MORE INFORMATION

1 EXISTING SIGN
NTS



MANUFACTURE & INSTALL TWO (2) SINGLE FACED, NON ILLUMINATED TRAFFIC CONTROL SIGNS.

CABINET - .125 ALUMINUM FACES, .063 ALUMINUM FILLER OVER INTERNAL ANGLE FRAME.
COPY TO BE 3M VINYL APPLIED FIRST SURFACE. FINISH TO BE SMOOTH.

COLOR SCHEDULE:

PT 1	PT 2	PT 3
PAINTED TO MATCH 3M VINYL #3630-33 (RED)	PAINTED TO MATCH PPG19803 BRIGHT BLUE METALLIC	3M VINYL #680-10 WHITE REFLECTIVE

NOTE: SEE SPECIFICATIONS FOR MORE INFORMATION

2 NEW SIGN
NTS

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ARCHITECTURAL SITE PLAN & DETAILS

A012

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EROSION CONTROL NOTES:

1. TO PREVENT SEDIMENTARY RUNOFF DURING CONSTRUCTION, STAKED HAYBALES, STAKED SILT SCREENS OR INLET DEBRIS CONTROL SCREENS ARE TO BE PLACED AT STORM INLETS, OUTFALL LOCATIONS AND ADJACENT PROPERTY LINES AS REQUIRED PRIOR TO ANY CONSTRUCTION ACTIVITIES.

SEDIMENT AND EROSION CONTROL DEVICES SHALL BE INSTALLED AND THEN VERIFIED/INSPECTED MANATEE COUNTY NATURAL RESOURCES DEPARTMENT PRIOR TO COMMENCEMENT OF CONSTRUCTION.

THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING THE SEDIMENTATION BARRIERS IN A WORKING MANNER FOR THE DURATION OF CONSTRUCTION AND SHOULD BE CHECKED DAILY. SILTATION ACCUMULATIONS GREATER THAN THE LESSER OF 12 INCHES OR ONE-HALF OF THE DEPTH OF THE SEDIMENTATION BARRIER SHALL BE IMMEDIATELY REMOVED AND REPLACED IN UPLAND AREAS. IN ADDITION TO SPECIFIED EROSION CONTROL LOCATIONS, THE CONTRACTOR SHALL PERFORM DAILY SITE INSPECTIONS FOR POTENTIAL EROSION PROBLEMS. IF PROBLEMS OCCUR, THE CONTRACTOR IS RESPONSIBLE FOR INSTALLING APPROPRIATE EROSION CONTROL IMMEDIATELY. STORMWATER TREATMENT FACILITIES INCLUDING OUTFALL PER DETAIL ARE TO BE CONSTRUCTED EARLY IN SITE DEVELOPMENT, WITH NO OFF-SITE UNTREATED RUN-OFF OCCURRING DURING CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE FOR REMOVING TEMPORARY EROSION CONTROL DEVICES FOLLOWING COMPLETION OF ALL CONSTRUCTION AND FINAL STABILIZATION.

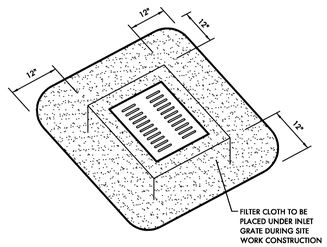
2. CONTRACTOR TO KEEP CONSTRUCTION ACTIVITIES AND EQUIPMENT TO A MINIMUM AT OUTFALL LOCATIONS WHICH DISCHARGE TO EXISTING JURISDICTIONAL AREAS. FLOATING OR STAKED TURBIDITY BARRIERS MAY BE USED IN LIEU OF STAKED HAYBALES/SILT SCREENS HERE WARRANTED.

3. ALL EROSION CONTROL MEASURES SHALL BE MAINTAINED IN-PLACE UNTIL THE SITE HAS BEEN STABILIZED AND REVEGETATED.

4. CONSTRUCTION METHOD AND MATERIALS TO BE IN ACCORDANCE WITH SECTION 104-6 OF THE FLORIDA DEPARTMENT OF TRANSPORTATION STANDARD CONSTRUCTION SPECIFICATIONS.

   a) HAY BALES MUST BE BUTTED CLOSE TOGETHER AND HAVE NO GAPS TO ALLOW FLOW TO PASS THROUGH WITHOUT BEING FILTERED.

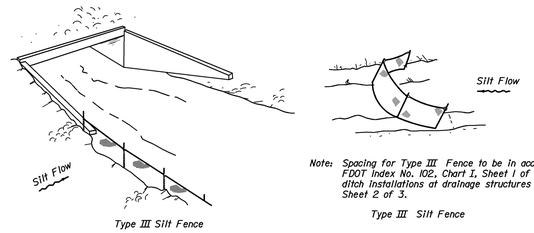
   b) JOINTS OF THE FILTER FABRIC MUST BE OVERLAPPED AND PROPERLY CONNECTED TO PREVENT ANY OPENING FROM OCCURRING.



NOTE:
HAY BALES SURROUNDING ENTIRE PERIMETER OF INLET MAY BE SUBSTITUTED FOR FILTER CLOTH

INLET DEBRIS CONTROL SCREEN

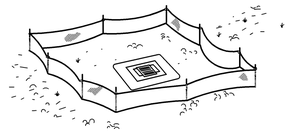
N.T.S.



Type III Silt Fence

Note: Spacing for Type III Fence to be in accordance with FDOT Index No. 102, Chart I, Sheet 1 of 3 and ditch Installations at drainage structures Sheet 2 of 3.

Type III Silt Fence

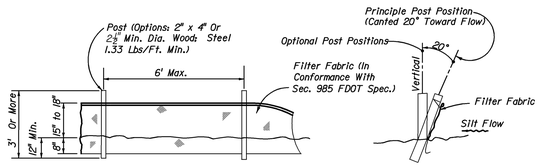


Type III Silt Fence Protection Around Ditch Bottom Inlets.

Do not deploy in a manner that silt fences will act as a dam across permanent flowing watercourses. Silt fences are to be used at upland locations and turbidity barriers used at permanent bodies of water.

SILT FENCE APPLICATIONS

N.T.S.



ELEVATION SECTION

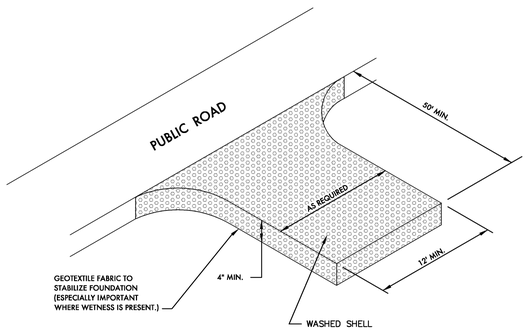
Note: Silt Fence to be paid for under the contract unit price for Staked Silt Fence (LF).

TYPE III SILT FENCE

N.T.S.

BALED HAY OR STRAW BARRIERS AND SILT FENCES

N.T.S.



NOTE:
ALL CONSTRUCTION ACCESS DRIVES SHALL BE STABILIZED AS SHOWN.

ACCESS PAD DETAIL

N.T.S.

THE UNDERSIGNED, AS AN AUTHORIZED REPRESENTATIVE OF MANATEE COUNTY GOVERNMENT, ACKNOWLEDGES RESPONSIBILITY FOR BEST MANAGEMENT PRACTICES AS THEY RELATE TO THE EROSION AND CONTROL AND SURFACE WATER MANAGEMENT SYSTEMS.

APPLICANT ACKNOWLEDGEMENT SIGNATURE
(PER S.W.F.W.M.D. DIRECTIVE)

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BEST MANAGEMENT PRACTICES

C1

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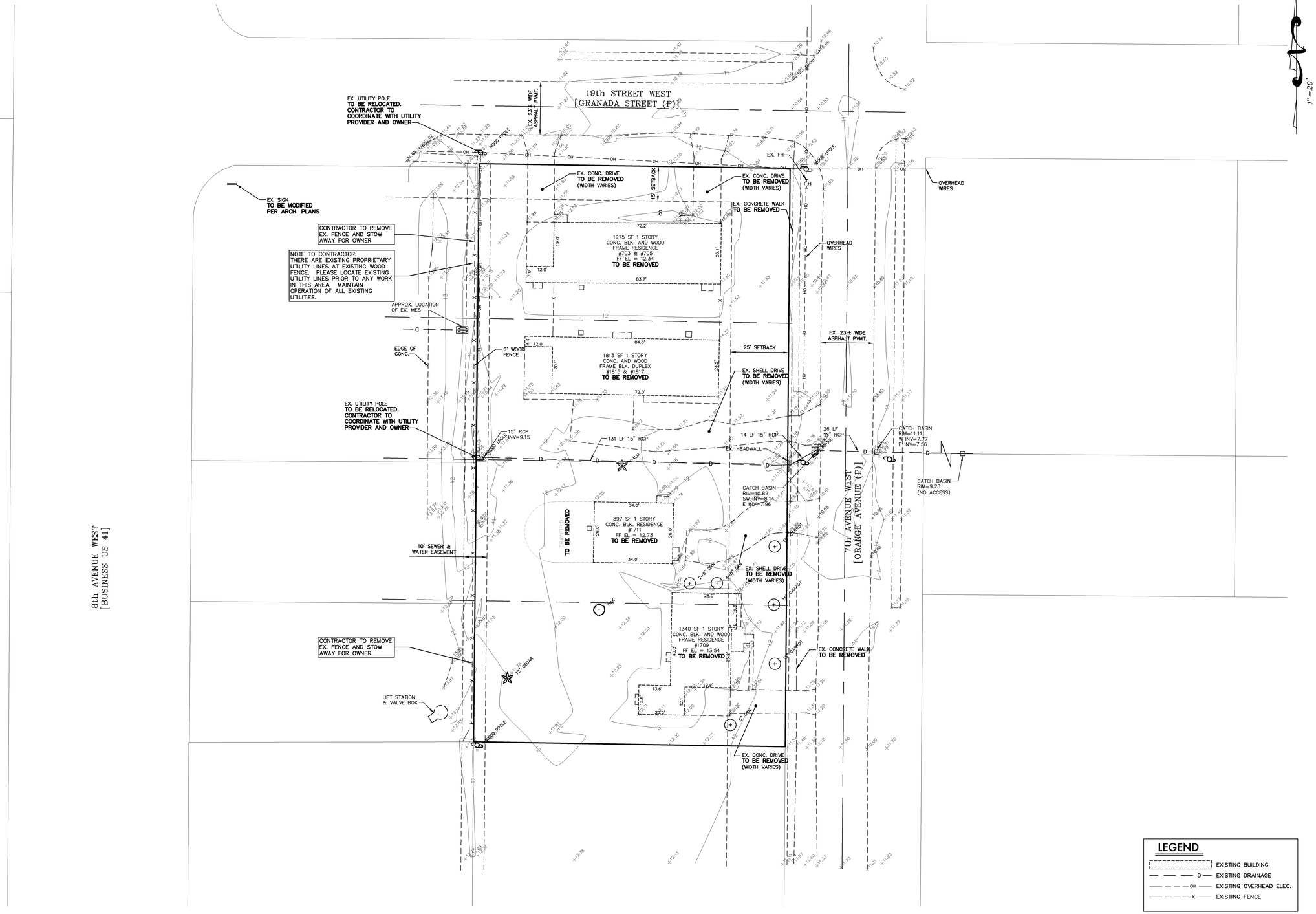

1" = 20'

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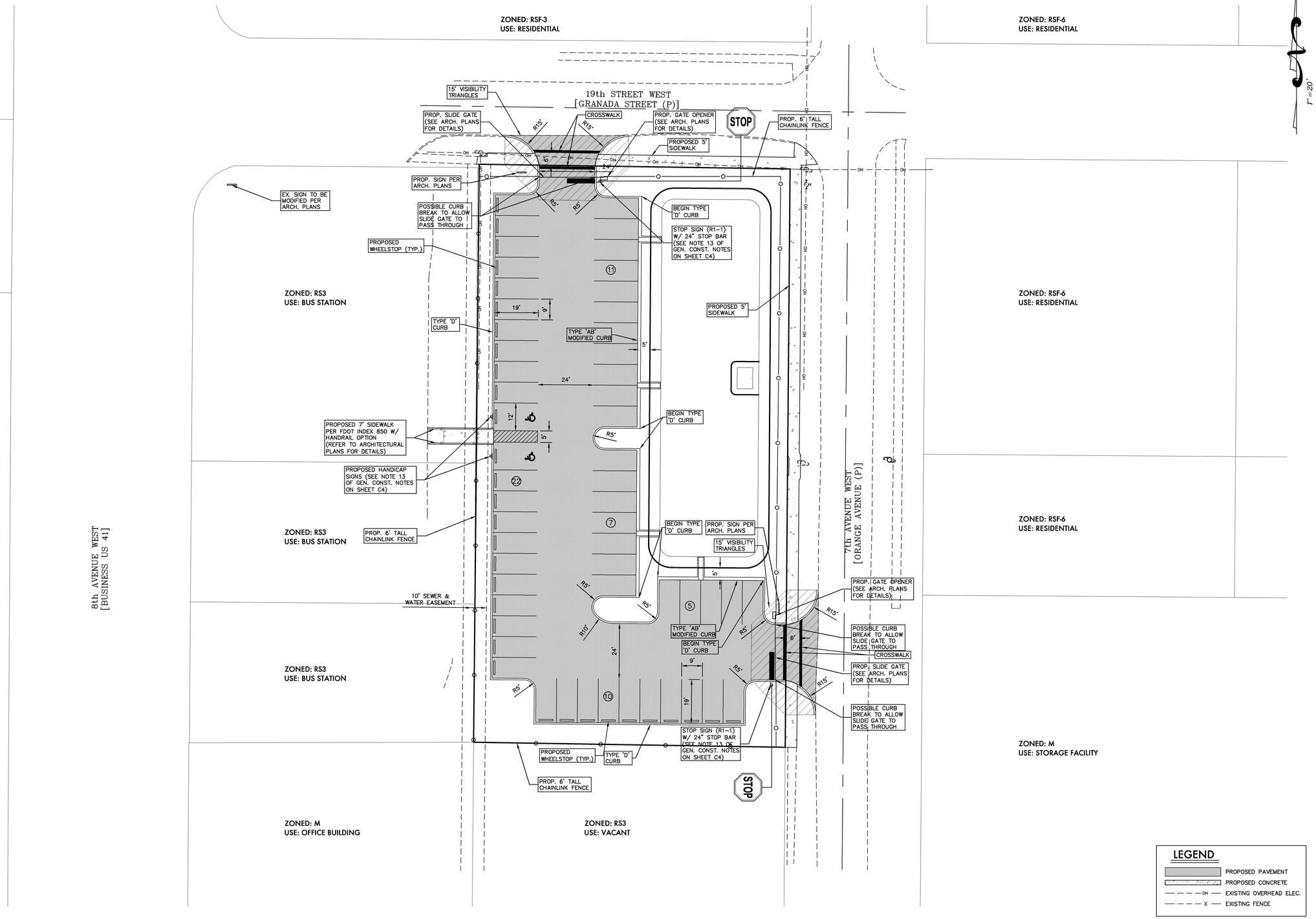
DEMOLITION PLAN

C2

100%
Construction Documents



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OFFSTREET PARKING PLAN

C3

100%
Construction Documents

DRAINAGE AND GRADING NOTES

1 ALL CONSTRUCTION IS TO BE STAKED IN THE FIELD BY OR UNDER THE SUPERVISION OF A FLORIDA REGISTERED LAND SURVEYOR.

2. THE CONTRACTOR IS TO PROVIDE THE ENGINEER OF RECORD WITH REPRODUCIBLE RECORD DRAWINGS SHOWING ALL IMPROVEMENT LOCATIONS AND ELEVATIONS IN ACCORDANCE WITH LATEST MANATEE COUNTY PLANNING, PERMITTING AND INSPECTIONS (MCPPI) AND SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT (SWFWMD) STANDARDS. THE CONTRACTOR SHALL ALSO PROVIDE FIVE SETS OF PRINTS, SIGNED AND SEALED BY A PROFESSIONAL LAND SURVEYOR, OF THE RECORD DRAWINGS TO THE ENGINEER OF RECORD. THESE RECORD DRAWINGS SHALL BE CERTIFIED TO THE OWNER, APPROPRIATE GOVERNMENTAL AGENCIES AND TO ZNS ENGINEERING, L.C. RECORD DRAWINGS SHALL SPECIFICALLY INCLUDE STORMWATER FACILITY LOCATIONS, INCLUDING TOP OF BANK, UNDERDRAIN AND CONTROL STRUCTURES, SHALL BE PERFORMED BY A REGISTERED LAND SURVEYOR AND REVIEWED BY THE ENGINEER OF RECORD PRIOR TO ACCEPTANCE AND PAYMENT. BENCH MARKS WITH THE ELEVATION CLEARLY AND PERMANENTLY MARKED ARE TO BE PLACED ON THE TOP OF ALL PROPOSED OUTFALL CONTROL STRUCTURES. RECORD DRAWINGS OF ALL MITIGATION AREAS INCLUDING ELEVATIONS, ZONES AND LIMITS SHALL BE PERFORMED BY A REGISTERED LAND SURVEYOR AND REVIEWED BY THE ENGINEER OF RECORD PRIOR TO ACCEPTANCE AND PAYMENT. THE RECORD DRAWINGS SHALL SPECIFICALLY INCLUDE THE SURFACE AREA OF STORMWATER FACILITY AREAS AT NORMAL WATER ELEVATION (NWL), AT HIGH WATER ELEVATION (HWL 25), TOP OF BANK AND ALL MITIGATION AND/OR LITTORAL SHELF AREAS.

3. TO PREVENT SEDIMENTARY RUNOFF DURING CONSTRUCTION, STAKED HAYBALES, STAKED SILT SCREENS OR INLET DEBRIS CONTROL SCREENS ARE TO BE PLACED AT STORM INLETS, OUTFALL LOCATIONS AND ADJACENT PROPERTY LINES AS REQUIRED PRIOR TO ANY CONSTRUCTION ACTIVITIES.

   SEDIMENT AND EROSION CONTROL DEVICES SHALL BE INSTALLED AND THEN VERIFIED/INSPECTED BY MANATEE COUNTY NATURAL RESOURCES DIVISION (749-3070) PRIOR TO COMMENCEMENT OF CONSTRUCTION.

   THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING THE SEDIMENTATION BARRIERS IN A WORKING MANNER FOR THE DURATION OF CONSTRUCTION AND SHOULD BE CHECKED DAILY. SILTATION ACCUMULATIONS GREATER THAN THE LESSER OF 12 INCHES OR ONE-HALF OF THE DEPTH OF THE SEDIMENTATION BARRIER SHALL BE IMMEDIATELY REMOVED AND REPLACED IN UPLAND AREAS. IN ADDITION TO SPECIFIED EROSION CONTROL LOCATIONS, THE CONTRACTOR SHALL PERFORM DAILY SITE INSPECTIONS FOR POTENTIAL EROSION PROBLEMS. IF PROBLEMS OCCUR, THE CONTRACTOR IS RESPONSIBLE FOR INSTALLING APPROPRIATE EROSION CONTROL IMMEDIATELY. STORMWATER TREATMENT FACILITIES INCLUDING OUTFALL PER DETAIL ARE TO BE CONSTRUCTED EARLY IN SITE DEVELOPMENT, WITH NO OFF-SITE UNTREATED RUN-OFF OCCURRING DURING CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE FOR REMOVING TEMPORARY EROSION CONTROL DEVICES FOLLOWING COMPLETION OF ALL CONSTRUCTION AND FINAL STABILIZATION.

4. ALL PIPE LENGTHS SHOWN ON PLAN VIEW ARE TO THE END OF THE MITERED END SECTION. REFER TO MITERED END SECTION DETAIL FOR LENGTH OF PIPE TO BE INCLUDED IN PRICE FOR MITERED END SECTION.

5. TOPOGRAPHIC AND PROPERTY SURVEYS GIVING LOT SIZE, GROUND ELEVATIONS, OBSTRUCTIONS ON SITE, LOCATIONS AND DEPTHS OF SEWERS, CONDUITS, PIPES, EXISTING STRUCTURES, CURBS, PAVEMENTS, TRACTS, AND SOIL BORING DATA GIVING THE NATURE OF GROUND AND SUBSURFACE CONDITIONS HAVE BEEN OBTAINED FROM RELIABLE SOURCES. THE ACCURACY OF THIS DATA IS NOT GUARANTEED, AND IS FURNISHED SOLELY AS AN ACCOMODATION TO THE CONTRACTOR. USE OF THIS DATA SHALL BE MADE AT THE CONTRACTOR'S DISCRETION. NO ADDITIONAL COMPENSATION WILL BE GRANTED DUE TO THE CONTRACTOR'S LACK OF KNOWLEDGE OF SITE CONDITIONS. PRIOR TO BID SUBMISSION, THE CONTRACTOR SHALL CONDUCT ANY ADDITIONAL SURVEYS AND SOILS TESTS HE MAY DEEM NECESSARY TO VERIFY THE ACCURACY OF THE INFORMATION PROVIDED.

6. THE CONTRACTOR SHALL VERIFY TOPOGRAPHY AND SATISFY HIMSELF AS TO THE EXTENT OF FILL NECESSARY TO ACHIEVE FINISHED GRADE PRIOR TO AWARD OF CONTRACT. THERE SHALL BE NO CLAIM FOR EXTRAS NOTWITHSTANDING SITE PLAN REVISIONS PROMULGATED SUBSEQUENT TO AWARD OF CONTRACT.

7. ALL BIDDERS ARE HEREBY ADVISED THAT ALL EXCAVATION ON THIS PROJECT MUST COMPLY WITH FLORIDA STATUTE 90-96 "TRENCH SAFETY ACT", AND THAT THE COST OF COMPLIANCE IS TO BE INCLUDED IN HIS BASE BID. THE BIDDER SHALL INDICATE ON THE BID FORM THE COSTS ASSOCIATED WITH COMPLIANCE.

8. SUITABLE FILL MATERIAL FROM STORMWATER FACILITIES EXCAVATION SHALL BE UTILIZED FOR PROJECT FILL PER GRADING SPECIFICATIONS. UNSUITABLE MATERIAL SHALL BE PLACED IN OPEN AREAS ONLY AS DIRECTED BY THE PROJECT ENGINEER AND SOILS ENGINEER.

9. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR ALL STRUCTURES PRIOR TO INSTALLATIONS.

10. REFER TO GRADING DETAIL SHEETS FOR CROSS SECTION DETAILS.

11. REFER TO CONSTRUCTION TECHNICAL SPECIFICATIONS FOR COMPACTION REQUIREMENTS, GRASSING/SODDING REQUIREMENTS, AND PAVING CONSTRUCTION MATERIAL SPECIFICATIONS.

12. ALL FILL AREAS ARE TO BE CONSTRUCTED IN 12" MAXIMUM LIFTS.

13. THE CONTRACTOR IS TO REVIEW SOILS TESTS AS PERFORMED BY THE SOIL CONSULTANT AND IS ENCOURAGED TO CONDUCT ON-SITE TESTING TO SATISFY HIMSELF AS TO ACTUAL LIMITS OF REMOVAL AND REPLACEMENT OF UNSUITABLE MATERIALS PRIOR TO BIDDING.

14. ALL CONTROL STRUCTURES SHALL HAVE A SEPARATE TOP SLAB TO ALLOW FOR FINAL ADJUSTMENT TO DESIGN GRADE. PRECAST CONTROL STRUCTURES SHALL BE CAST SO AS TO ALLOW A MINIMUM OF 6" OF BRICK ADJUSTMENT FOR CONSTRUCTION OF THE WEIR(S).

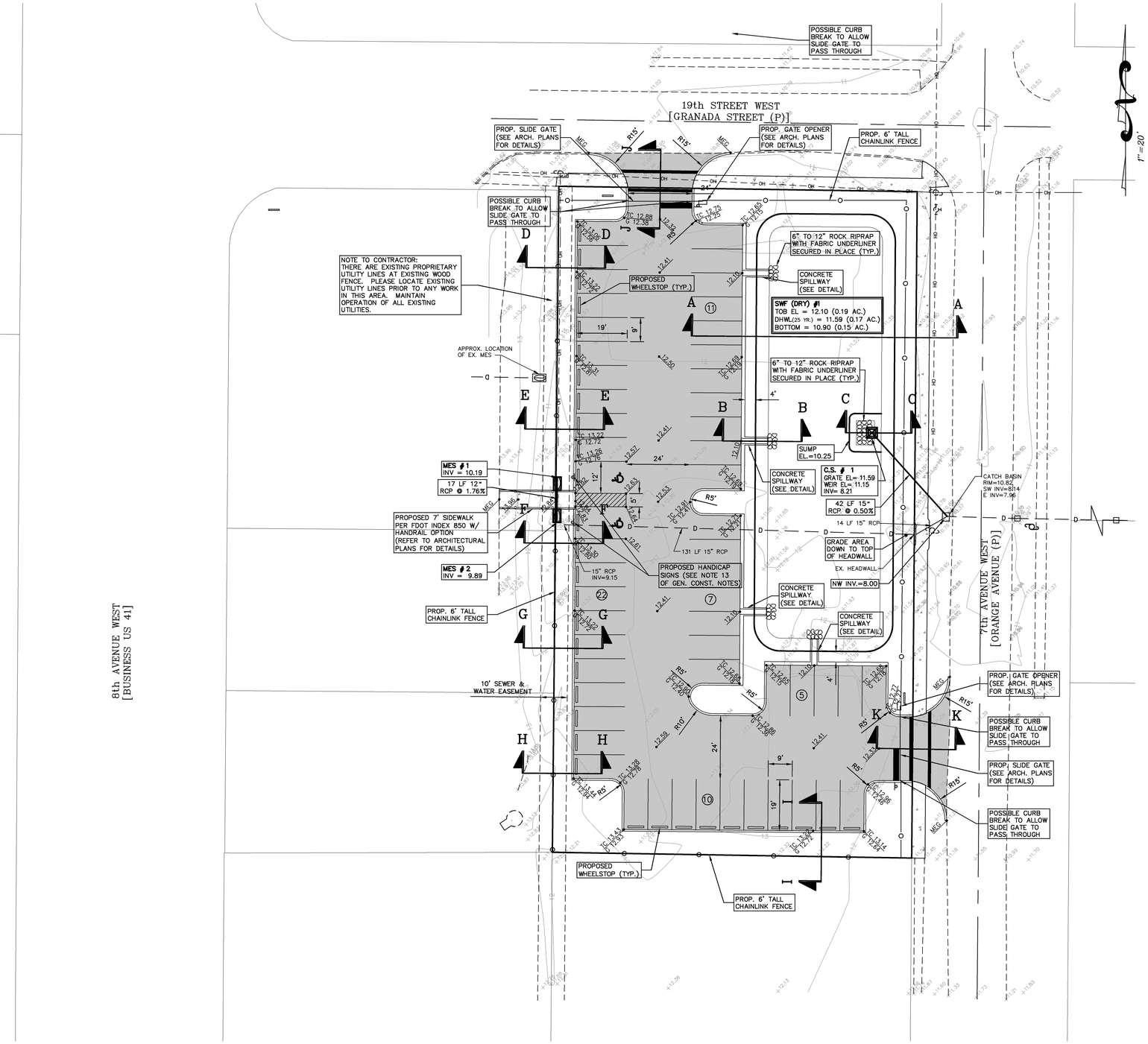
15. ON SLOPES GREATER THAN 3:1 PEGGING OR PINNING OF SOD MAY BE REQUIRED.

GENERAL CONSTRUCTION NOTES

1. ALL PROPOSED CONSTRUCTION IS TO MEET OR EXCEED LATEST APPLICABLE MANATEE COUNTY PUBLIC WORKS UTILITY STANDARDS (LATEST REVISION NOVEMBER, 1999) AND IS TO MEET ENGINEER'S SPECIFICATIONS. ALL PROPOSED CONSTRUCTION IS TO BE PUBLICLY OWNED AND MAINTAINED FOLLOWING COMPLETION AND ACCEPTANCE. RIGHT OF WAY AND OTHER OFF-SITE IMPROVEMENTS SHALL BE PUBLICLY OWNED AND MAINTAINED FOLLOWING COMPLETION AND ACCEPTANCE.
2. THE CONTRACTOR IS TO COORDINATE THE LOCATION AND ELEVATION OF ALL UTILITY AND IRRIGATION SERVICE SLEEVES WITH RESPECTIVE AGENCY PRIOR TO CONSTRUCTION.
3. THE CONTRACTOR IS TO ASSURE HIMSELF THAT ALL UNDERGROUND UTILITIES AND STORM SEWER IS CONSTRUCTED, TESTED AND OPERATIONAL PRIOR TO ANY ROADWAY CONSTRUCTION.
4. ALL PROPOSED ELECTRICAL AND COMMUNICATION SERVICES ARE TO BE LOCATED UNDERGROUND AS DIRECTED BY RESPECTIVE AGENCY.
5. CURBING AT SIDEWALK INTERSECTIONS TO BE RECESSED FOR PEDESTRIAN RAMPS. RAMPS TO BE CONSTRUCTED AT TIME OF CURB RADII.
6. CONTRACTOR TO OBTAIN APPLICABLE PERMITS PRIOR TO COMMENCEMENT OF CONSTRUCTION.
7. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATION AND ISSUANCE OF ALL COMMENCEMENT AND/OR PROGRESS NOTICES TO GOVERNMENTAL AGENCIES DURING THE COURSE OF CONSTRUCTION, AS REQUIRED FOR INSPECTION, TESTING AND TRACKING PER APPLICABLE AGENCY PERMIT CONDITIONS.
8. CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND COMPLYING WITH ALL PERMIT CONDITIONS AND STIPULATIONS FOR ALL LOCAL, REGIONAL AND STATE AGENCIES, INCLUDING, BUT NOT LIMITED TO, FINAL SITE PLANS, UTILITIES, DRAINAGE, FUGITIVE PARTICULATES AND EROSION.
9. ALL UTILITIES AND/OR DRAINAGE SHOWN AS EXISTING WERE DERIVED FROM THE BEST AVAILABLE INFORMATION. IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY THE ACTUAL LOCATION, SIZE, TYPE AND AMOUNT OF EXISTING UTILITIES PRIOR TO CONSTRUCTION. THE CONTRACTOR TO NOTIFY SUNSHINE UNDERGROUND FACILITIES NOTIFICATION (1-800-432-4770), MCPWD AND FP&L 48 HOURS MINIMUM PRIOR TO START OF CONSTRUCTION FOR POSSIBLE UTILITY LOCATIONS NOT SHOWN ON PLANS.
10. RIGHT-OF-WAY USE PERMIT TO BE OBTAINED BY THE CONTRACTOR FOR OFF-SITE CONSTRUCTION.
11. THE CONTRACTOR IS RESPONSIBLE FOR ESTIMATING AND CALCULATING ALL CUT AND FILL QUANTITIES. PRIOR TO BID SUBMISSION THE CONTRACTOR SHALL CONDUCT ANY ADDITIONAL SURVEYS AND SOIL TESTS HE DEEMS NECESSARY TO CALCULATE THE CUT AND FILL QUANTITIES PROPERLY. ADDITIONAL SURVEYS AND TESTS MADE BY THE CONTRACTOR SHALL BE MADE AT NO ADDITIONAL COST TO THE OWNER.
12. ALL EASEMENTS AS SHOWN WITHIN THE PROJECT BOUNDARY LIMITS ARE TO BE CONSIDERED PUBLIC (UNLESS OTHERWISE STATED).
13. THERE ARE NO KNOWN WELLS WITHIN THE BOUNDARIES OF THIS PLAN, CONNECTION IS TO BE MADE TO THE WELL ON THE ADJACENT BUS STATION SITE.
14. ALL SIGN POSTS ARE TO BE ROUND ALUMINUM POLES.

NOTE

THE DESIGN AND DETAILS AS INDICATED ON THESE PLANS REFLECT THE CURRENT COUNTY PRACTICES AND INTERPRETATIONS RELATED TO THE COUNTY REGULATIONS. THESE PRACTICES AND INTERPRETATIONS MAY NOT BE IDENTICAL TO THE REGULATIONS AS ARE CURRENTLY WORDED AND ARE SUBJECT TO CHANGE.



LEGEND

- PROPOSED PAVEMENT
- PROPOSED SIDEWALK
- OH — EXISTING OVERHEAD ELEC.
- X — EXISTING FENCE

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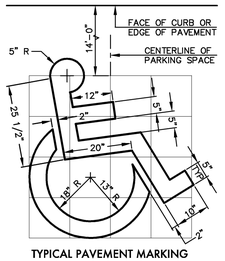
DRAINAGE AND GRADING PLAN

C4

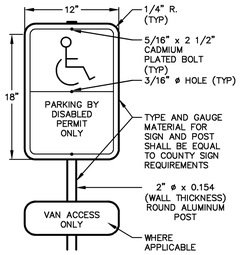
100%
Construction Documents



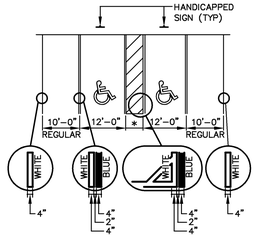
TYPICAL PAVEMENT MARKING
FOR HANDICAPPED PARKING SPACE

NOTES:

1. ALL LETTERS ARE 1" SERIES "C" PER M.U.T.C.D.
2. TOP PORTION OF SIGN SHALL HAVE A HIGHLY REFLECTORIZED BLUE BACKGROUND WITH WHITE REFLECTORIZED LEGEND AND BORDER.
3. BOTTOM PORTION OF SIGN SHALL HAVE A HIGHLY REFLECTORIZED WHITE BACKGROUND WITH BLACK OPAQUE LEGEND AND BORDER.
4. ONE (1) SIGN REQUIRED FOR EACH PARKING SPACE.
5. HEIGHT OF SIGN SHALL BE IN ACCORDANCE WITH SECTION 2A-23 OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (M.U.T.C.D.).



TYPICAL STALL MARKINGS



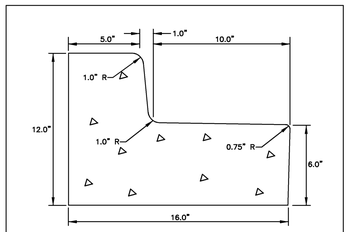
NOTE: ALL HANDICAPPED PAVEMENT MARKINGS ARE BLUE UNLESS OTHERWISE NOTED.

* 5'-0" OR 8'-0" (SEE PLANS)

TYPICAL STALL MARKINGS

HANDICAP PARKING DETAIL

N.T.S.

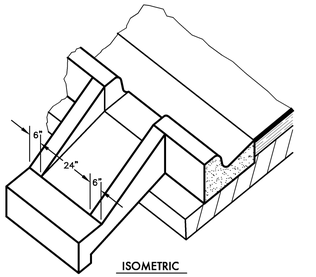


TYPE "AB"
MODIFIED CURB & GUTTER

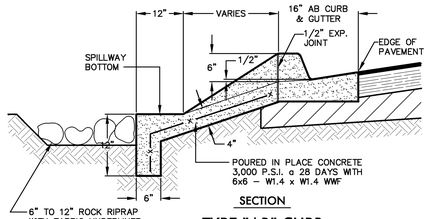
A) CLASS 1 CONCRETE 3,000 PSI AT 28 DAYS.

B) CURB AND GUTTER SHALL MEET THE SPECIFICATIONS ESTABLISHED BY FLORIDA D.O.T. STANDARD SPECIFICATIONS PER F.D.O.T. ROADWAY AND TRAFFIC DESIGN STANDARDS STANDARDS INDEX NO. 300, LATEST REVISION.

MANATEE COUNTY TRANSPORTATION DEPARTMENT			
REV.BY	DATE		
		6/12/07 DATE OF B.O.C.C. APPROVAL	TYPE "AB" MODIFIED CURB & GUTTER
			201.3



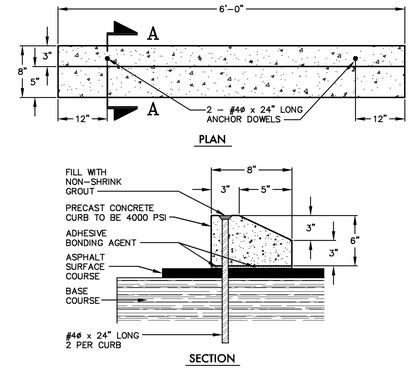
ISOMETRIC



SECTION

TYPE "AB" CURB CONCRETE SPILLWAY DETAIL

N.T.S.

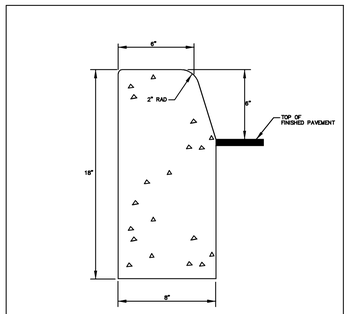


PLAN

SECTION

CONCRETE WHEEL STOP DETAIL

N.T.S.

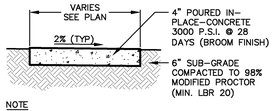


TYPE "D"
HIGH BACK CURB

A) CLASS 1 CONCRETE, 3,000 P.S.I. AT 28 DAYS.

B) CURB SHALL MEET THE SPECIFICATIONS ESTABLISHED BY F.D.O.T. STANDARD SPECIFICATIONS PER F.D.O.T. ROADWAY AND TRAFFIC DESIGN STANDARDS INDEX NO. 300, LATEST REVISION.

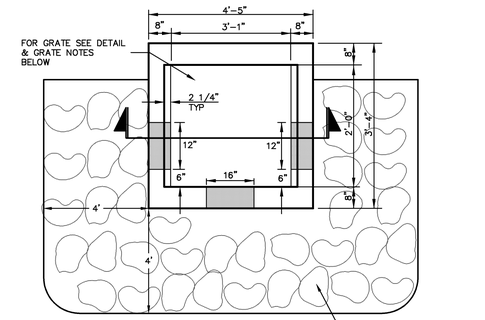
MANATEE COUNTY TRANSPORTATION DEPARTMENT			
REV.BY	DATE		
		6/12/07 DATE OF B.O.C.C. APPROVAL	TYPE D CURB
			201.4

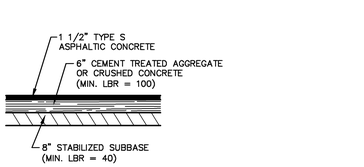


NOTE
WHERE CONCRETE SIDEWALK TIES IN WITH ANOTHER RIGID SURFACE, A 1/2" EXPANSION JOINT SHALL BE USED.

TYPICAL SIDEWALK DETAIL

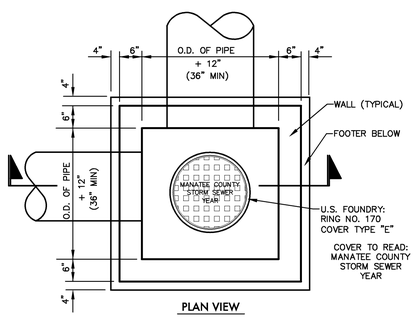
N.T.S.



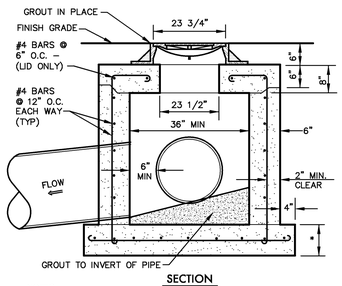


PAVEMENT DETAIL

N.T.S.



PLAN VIEW



SECTION

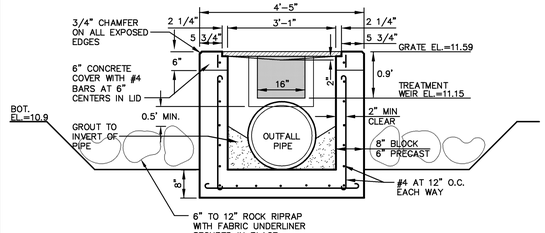
NOTES:

1. CONTRACTOR TO SUBMIT SHOP DRAWINGS FOR APPROVAL PRIOR TO CONSTRUCTION, SHOULD ANY VARIANCE OF THIS DETAIL BE NECESSARY.

* 6" BOTTOM SLAB = NOT TRAFFIC BEARING AREAS
8" BOTTOM SLAB = TRAFFIC BEARING AREAS

JUNCTION BOX DETAIL

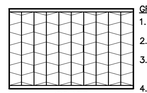
N.T.S.



SECTION

NOTES:

1. CONTRACTOR TO SUBMIT SHOP DRAWINGS FOR APPROVAL PRIOR TO CONSTRUCTION, SHOULD ANY VARIANCE OF THIS DETAIL BE NECESSARY.
2. BENCH MARKS WITH THE ELEVATIONS CLEARLY AND PERMANATELY MARKED ARE TO BE PLACED ON THE TOP OF ALL OUTFALL CONTROL STRUCTURES.
3. GREASE/OIL SKIMMER TO BE ATTACHED TO WINDOW SIDE OF STRUCTURE (PER DETAIL).
4. ALL CONTROL STRUCTURES SHALL HAVE A SEPARATE TOP SLAB TO ALLOW FOR FINAL ADJUSTMENT TO DESIGN GRADE. PRECAST CONTROL STRUCTURES SHALL BE CAST SO AS TO ALLOW A MINIMUM OF 6" OF BRICK ADJUSTMENT FOR CONSTRUCTION OF THE WEIRS.



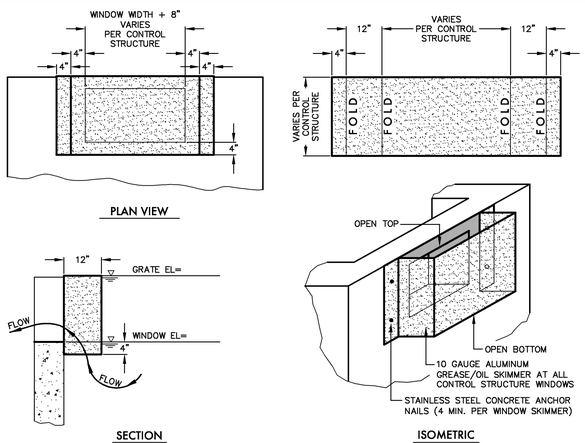
GRATE

GRATE NOTES:

1. ALL GRATES TO BE GALVANIZED STEEL.
2. TRAFFIC BEARING GRATE TO BE U.S. FOUNDRY NO. 6611.
3. NON-TRAFFIC BEARING GRATE TO BE U.S. FOUNDRY NO. 6606.
4. GRATE TO BE CHAINED TO STRUCTURE PER F.D.O.T. SPECIFICATIONS.

TYPE "C" CONTROL STRUCTURE DETAIL

N.T.S.



GREASE/OIL SKIMMER DETAIL

N.T.S. (TO BE USED ON ALL CONTROL STRUCTURES)

SCHENKELSHULTZ
ARCHITECTURE
677 North Washington Blvd.
Sarasota, FL 34236
voice 941.952.5875
fax 941.957.3630
schenkelshultz.com
SS Lic No - AA-C000937

JEB C. MULOCK
PROFESSIONAL ENGINEER #64692

SIGNATURE

ZNS ENGINEERING
201 5th Avenue Drive East
Bradenton, Fl 34208
voice 941.748.8080
fax 941.748.3316
email zns@znseng.com

Park And Ride

1711 7th Avenue West
Palmetto, FL 34221

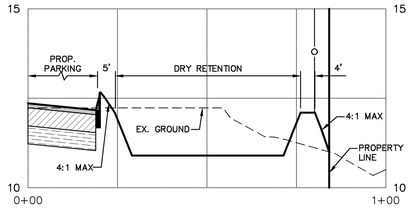
Client:
Manatee County Government
1112 Manatee Avenue West
Bradenton, FL 34208

drawn: MF
checked: JCM
date: 10.08.2010
comm. no.: 1020805

ENGINEERING DETAILS

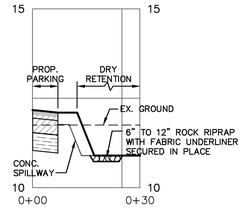
C5

100%
Construction Documents



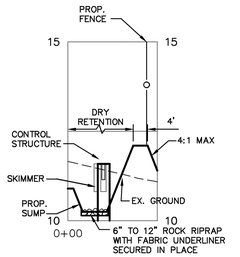
SECTION A–A

SCALE: H: 1"=20'
V: 1"=2'



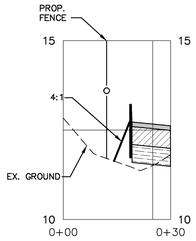
SECTION B–B

SCALE: H: 1"=20'
V: 1"=2'



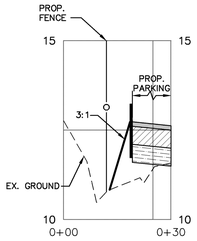
SECTION C–C

SCALE: H: 1"=20'
V: 1"=2'



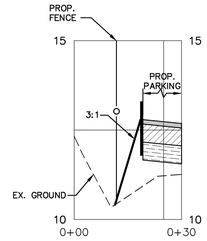
SECTION D–D

SCALE: H: 1"=20'
V: 1"=2'



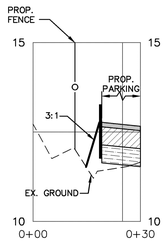
SECTION E–E

SCALE: H: 1"=20'
V: 1"=2'



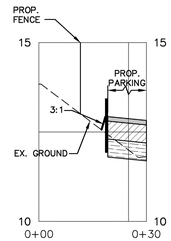
SECTION F–F

SCALE: H: 1"=20'
V: 1"=2'



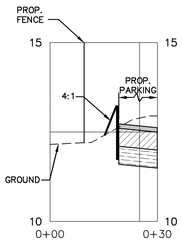
SECTION G–G

SCALE: H: 1"=20'
V: 1"=2'



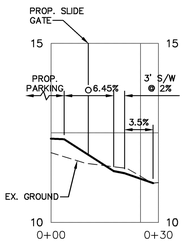
SECTION H–H

SCALE: H: 1"=20'
V: 1"=2'



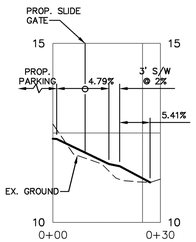
SECTION I–I

SCALE: H: 1"=20'
V: 1"=2'



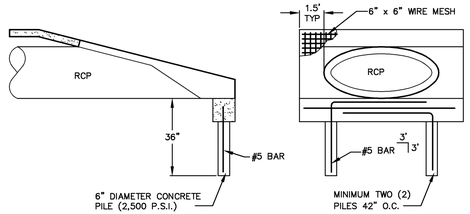
SECTION J–J

SCALE: H: 1"=20'
V: 1"=2'



SECTION K–K

SCALE: H: 1"=20'
V: 1"=2'



NOTE:
SEE MITERED END SECTION DETAIL FOR MITERED END SECTION SPECIFICATIONS.

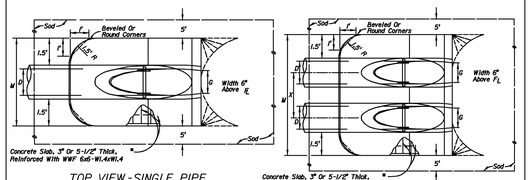
MITERED END SECTION FOOTER DETAIL

N.T.S.

ROUND PIPE

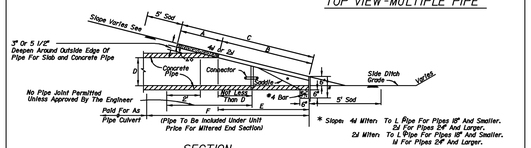
DIMENSIONS AND QUANTITIES

	D	X	A	B	C	E	F	G	M Single Pipe	M Double Pipe	M Triple Pipe	M Quad. Pipe
2d Slope	15"	2'-7"	1.56'	2.18'	4.43'	2.06'	5'	1.25'	4.63"	7.29"	9.79"	12.39"
	18"	2'-10"	1.58'	2.74'	4.71'	2.56'	6'	1.46'	4.92"	7.75"	10.58"	13.46"
	24"	3'-5"	2.06'	3.85'	5.28'	3.56'	7'	1.73'	5.50"	8.58"	12.33"	15.75"
	30"	4'-3"	2.57'	4.95'	7.67'	4.56'	8'	2.00'	6.08"	10.33"	14.58"	18.83"
	36"	5'-1"	2.85'	6.08'	8.33'	5.56'	9'	2.24'	6.67"	11.75"	16.83"	21.92"
	42"	5'-10"	2.34'	7.37'	9.55'	6.56'	10'	2.49'	7.25"	13.25"	19.25"	25.25"
	48"	6'-8"	2.43'	8.33'	10.75'	7.56'	11'	2.65'	7.83"	14.58"	21.33"	28.08"
	54"	7'-6"	2.52'	9.44'	11.96'	8.56'	12'	2.83'	8.42"	16.08"	23.75"	31.42"
	60"	8'-4"	2.62'	10.56'	13.18'	9.56'	13'	3.00'	9.00"	17.50"	26.00"	34.50"
	66"	9'-2"	2.71'	11.68'	14.39'	10.56'	13'	3.18'	9.58"	18.75"	27.92"	37.08"
	72"	10'-0"	2.80'	12.82'	15.60'	11.56'	15'	3.30'	10.16"	20.83"	30.67"	40.67"
4d Slope	15"	2'-7"	2.23'	4.09'	6.36'	4.03'	9'	1.25'	4.63"	7.29"	9.79"	12.39"
	18"	2'-10"	2.36'	5.02'	7.48'	5.03'	9'	1.46'	4.92"	7.75"	10.58"	13.46"
	24"	3'-5"	2.53'	7.18' △	9.71'	7.03' △	11'	1.73'	5.50"	8.58"	12.33"	15.75"
	30"	4'-3"	2.70'	9.25'	8.95'	9.03'	13'	2.00'	6.08"	10.33"	14.58"	18.83"
	36"	5'-1"	2.85'	11.32' ◇	14.82'	11.03' ◇	15'	2.24'	6.67"	11.75"	16.83"	21.92"
	42"	6'-1"	3.05'	13.37'	16.45'	13.03'	17'	2.49'	7.25"	13.25"	19.25"	25.25"
	48"	6'-9"	3.22'	15.43'	18.65'	15.03'	19'	2.65'	7.83"	14.58"	21.33"	28.08"
	54"	7'-8"	3.39'	17.49'	20.89'	17.03'	21'	2.83'	8.42"	16.08"	23.75"	31.42"
	60"	8'-6"	3.56'	19.55'	23.1'	19.03'	23'	3.00'	9.00"	17.50"	26.00"	34.50"
	66"	9'-3"	3.73'	21.62'	25.35'	21.03'	25'	3.18'	9.58"	18.75"	27.92"	37.08"
	72"	10'-0"	3.9'	23.68'	26.59'	23.03'	27'	3.30'	10.16"	20.83"	30.67"	40.67"



TOP VIEW - SINGLE PIPE

TOP VIEW - MULTIPLE PIPE



SECTION

MANATEE COUNTY TRANSPORTATION DEPARTMENT			
REV.BY	DATE		
		6/12/07 DATE OF B.O.C.C. APPROVAL	MITERED END SECTION FOR ROUND, SINGLE & MULTIPLE PIPES
			102.2

SCHENKELSHULTZ
ARCHITECTURE
677 North Washington Blvd.
Sarasota, FL 34236
voice 941.952.5875
fax 941.957.3630
schenkelshultz.com
SS Lic No - AA-C000937

JEB C. MULOCK
PROFESSIONAL ENGINEER #64692

SIGNATURE

ZNS ENGINEERING

Park And Ride

1711 7th Avenue West
Palmetto, FL 34221

Client:
Manatee County Government
1112 Manatee Avenue West
Bradenton, FL 34208

drawn: MF
checked: JCM
date: 10.08.2010
comm. no.: 1020805

ENGINEERING DETAILS AND SECTIONS

C6

100%
Construction Documents

GENERAL NOTES ELECTRICAL

GENERAL NOTES APPLY TO ALL ELECTRICAL DRAWINGS.

1. DO NOT SCALE FROM THESE DRAWINGS.
2. ALL WORK SHALL BE DONE IN STRICT ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE.
3. THE Division 26 CONTRACTOR SHALL COORDINATE WORK WITH ALL OTHER TRADES TO ASSURE PROPER CLEARANCES FOR EQUIPMENT AND TO KEEP THE JOB PROGRESSING.
4. ALL EXTERIOR WIRING DEVICES TO BE WEATHERPROOF AND SHALL BE G.F.I. TYPE.
5. CONDUIT RUNS SHOWN ARE DIAGRAMMATIC IN NATURE. Division 26 CONTRACTOR IS RESPONSIBLE FOR SIZING AND LOCATING PULL BOXES PER NEC AND FOR COORDINATION WITH OTHER DISCIPLINES.
6. ALL H.I.D. LIGHT FIXTURES SHALL BE FURNISHED WITH INTEGRAL FUSING.

ABBREVIATIONS

NOTE: ALL ABBREVIATIONS MAY NOT BE USED.

1P	SINGLE POLE	MCA	MINIMUM CIRCUIT AMPS
1PH	SINGLE-PHASE	MCB	MAIN CIRCUIT BREAKER
3PH	THREE-PHASE	MDP	MAIN DISTRIBUTION PANEL
A OR AMP	AMPERE	MIN	MINIMUM
AFF	ABOVE FINISHED FLOOR	MLO	MAIN LUGS ONLY
AFG	ABOVE FINISHED GRADE	MOCP	MAXIMUM OVER CURRENT PROTECTION
AIC	AMPERE INTERRUPTING CAPACITY	NEC	NATIONAL ELECTRICAL CODE
AMP	AMPERE	[N]	NEW
AWG	AMERICAN WIRE GAUGE	[NL]	NEW LOCATION OF EXISTING
CB	CIRCUIT BREAKER	PH	PHASE
CKT	CIRCUIT	PNL	PANEL
CLG	CEILING (TYPICALLY CEILING MOUNTED)	[R]	EXISTING TO BE REMOVED
		[RL]	EXISTING TO BE RELOCATED
CM	CONSTRUCTION MANAGER	[RP]	EXISTING TO BE REPLACED
CU	COPPER	RMC	RIGID METAL CONDUIT
EQPT	EQUIPMENT	SPD	SURGE PROTECTION DEVICE
EMT	ELECTRICAL METALLIC TUBING	TBD	TO BE DETERMINED
[E]	EXISTING TO REMAIN	TYP	TYPICAL
FA	FIRE ALARM	UON OR UNO	UNLESS OTHERWISE NOTED
FACP	FIRE ALARM CONTROL PANEL	UPS	UNINTERRUPTIBLE POWER SUPPLY
FLA	FULL LOAD AMPS	V	VOLTS
G OR GRD	GROUND	VA	VOLT AMPERE
GFCI	GROUND FAULT CIRCUIT INTERRUPTER	VFD	VARIABLE FREQUENCY DRIVE
HP	HORSE POWER	WP	WEATHERPROOF, FULLY GASKETED ALUMINUM BACKBOX WITH IMC RACEWAY AND THREADED FITTINGS. PROVIDE COMPONENTS WITH U.L. WET LABEL
J-BOX	JUNCTION BOX		
KVA	KILOVOLT AMPERE		
kW	KILOWATT		
kWh	KILOWATT HOUR		
LC	LOAD CENTER		
LED	LIGHT EMITTING DIODE	XFMR	TRANSFORMER
LFMC	LIQUID TIGHT FLEXIBLE METAL CONDUIT		

NOTE: NOT ALL SYMBOLS SHOWN ON LEGEND ARE USED ON FLOOR PLANS.

ELECTRICAL LEGEND

WIRING DEVICES – REFER TO THE SPECIFICATIONS

NOTE: RECEPTACLES SHALL BE VERTICALLY MOUNTED WITH THE GROUND PIN HOLE LOCATED AT THE "TWELVE O'CLOCK" (TOP OF DEVICE) POSITION U.N.O.

NOTE: THE FOLLOWING ABBREVIATIONS APPLY TO WIRING DEVICES WHERE INDICATED:

GFCI TYPE DUPLEX RECEPTACLE, 20 AMP, HEAVY DUTY, RECESS MOUNT 18"AFF TO CENTER OF BACKBOX U.N.O.

GFCI TYPE DUPLEX RECEPTACLE, 20 AMP, HEAVY DUTY, RECESS MOUNT ABOVE SINK, COUNTER, CASEWORK, ETC. COORDINATE MOUNTING HEIGHT WITH ARCHITECTURAL ELEVATIONS AND/OR EXISTING CONDITIONS PRIOR TO ROUGH-IN

POWER DISTRIBUTION – REFER TO THE RISER DIAGRAM AND SPECIFICATIONS

PNL — PANELBOARD, REFER TO THE "PANELBOARD SCHEDULE"

FEEDER, BRANCH CIRCUIT OR SWITCH LEG CONCEALED UNDERGROUND

HOMERUN TO PANELBOARD WITH CIRCUIT(S) INDICATED.

HOMERUN TO PANELBOARD WITH DIRECT ELECTRICAL CONNECTION TO EQUIPMENT.

SERVICE GROUND. PROVIDE, IN A TRIANGULAR PATTERN, A MINIMUM OF (3) 5/8"DIA, 10 FOOT LONG COPPER-CLAD STEEL GROUND RODS LOCATED AT LEAST 10 FEET APART. ALL CONNECTIONS SHALL BE EXOTHERMICALLY WELDED. PROVIDE NON-METALLIC TEST WELL AND COVER OVER EACH ROD WHEN ASSEMBLY IS LOCATED IN LANDSCAPE AREA (PREFERRED AREA). PROVIDE CONCRETE WELL WITH METAL TRAFFIC COVER OVER EACH ROD WHEN ASSEMBLY IS LOCATED IN HARD SURFACE AREAS, SUCH AS CONCRETE, ASPHALT, ETC.

(#) INDICATES FEEDER SIZE ON ELECTRICAL RISER DIAGRAM. REFER TO THE "FEEDER SCHEDULE"

TWO-POLE, 240V RATED, SERVICE DISCONNECT SWITCH. PROVIDE HEAVY DUTY, NON-FUSED, NEMA-1 SWITCH U.N.O.. REFER TO PLANS AND SCHEDULES FOR ADDITIONAL REQUIREMENTS. PROVIDE NEMA-3R WEATHERPROOF ENCLOSURE, IMC RACEWAY WITH THREADED FITTINGS, ETC. FOR DAMP AND WET LOCATIONS.

LIGHTING FIXTURES – REFER TO THE LIGHTING FIXTURE SCHEDULE

NOTE: THE FOLLOWING ABBREVIATIONS APPLY TO LIGHTING FIXTURES WHERE INDICATED:

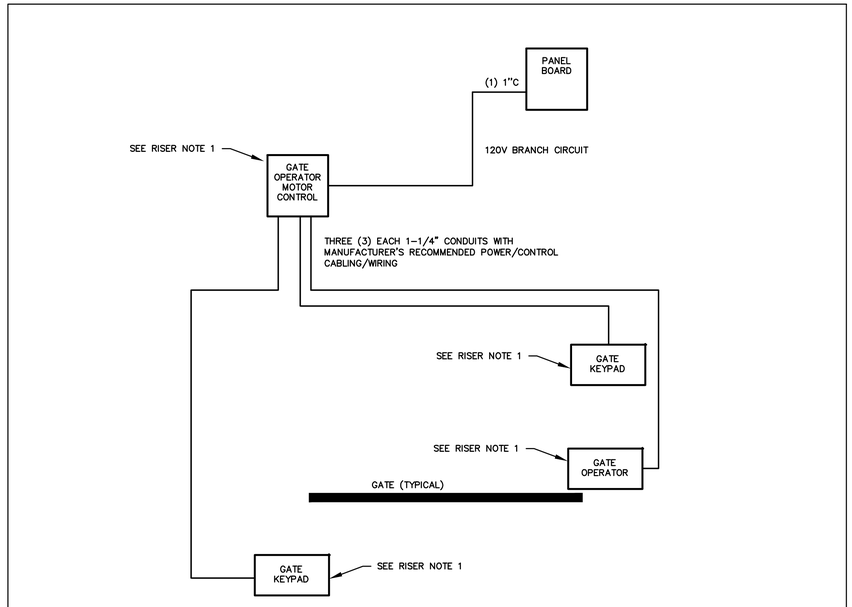
LIGHTING FIXTURE AND POLE ASSEMBLY. PROVIDE FIXTURE(S), POLE, ARM, ALL REQUIRED MOUNTING BRACKETS, COMPONENTS, HARDWARE, ETC AND CONCRETE BASE (IF REQUIRED). REFER TO THE PARKING LOT LIGHTING POLE BASE DETAIL.

(PC) PHOTOCELL, PROVIDE TYPE AND CONFIGURATION AS REQUIRED BY LIGHTING CONTROL PANEL MANUFACTURER. INCLUDE 5-YEAR WARRANTY. PROVIDE ALL REQUIRED MOUNTING BRACKETS, COMPONENTS, HARDWARE, ETC. FACE PHOTOCELL NORTH.

MISCELLANEOUS

(A) DETAIL INDICATOR. REFER TO REFERENCED DETAIL

(#) NOTE INDICATOR. REFER TO THE "KEY NOTES" WHERE INDICATED



GENERAL NOTES:

A. ALL SPECIAL SYSTEMS COMPONENTS SHOWN ARE NEW UNLESS NOTED OTHERWISE (U.N.O.).

B. PROVIDE LONG SWEEP ELLS FOR ALL CONDUITS SHOWN.

C. PROVIDE (DEFINED AS "FURNISH AND INSTALL") ALL LABOR AND MATERIALS REQUIRED TO CREATE A RACEWAY SYSTEM FOR WIRING AND COMPONENTS PROVIDED BY OTHERS.

D. PROVIDE ENGRAVED, PLASTIC LAMINATE NAMEPLATE ON ALL CONTROL PANELS, TERMINAL CABINETS, BACKBOARDS, ETC. NAMEPLATE SHALL STATE EQUIPMENT NAME AS INDICATED ON THIS DRAWING, AS REQUIRED TO COMPLY WITH OWNERS STANDARD NAMING CONVENTION OR AS REQUIRED BY THE AUTHORITY HAVING JURISDICTION. PROVIDE BLACK NAMEPLATE COLOR WITH 1/2" HIGH WHITE TEXT. NAMEPLATES SHALL BE FASTENED TO EQUIPMENT WITH RIVETS OR SCREWS.

RISER NOTES:

1. TYPICAL EQUIPMENT LOCATION. CONFIRM LOCATION IN THE FIELD WITH OWNER'S VENDOR. COORDINATE REQUIREMENTS WITH GENERAL CONTRACTOR PRIOR TO BID.

MOTOR OPERATED GATE RACEWAY ONE-LINE DIAGRAM — NO SCALE — 1

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Checked: S.T.P. Date: 10/08/2010
Drawn: B.P.Z. C.O.A. 27552

TO THE BEST OF MY KNOWLEDGE, SAID PLANS AND SPECIFICATIONS COMPLY WITH ALL APPLICABLE BUILDING CODES.

BRYAN P. ZAPF, P.E.
FL# 46141

Park And Ride

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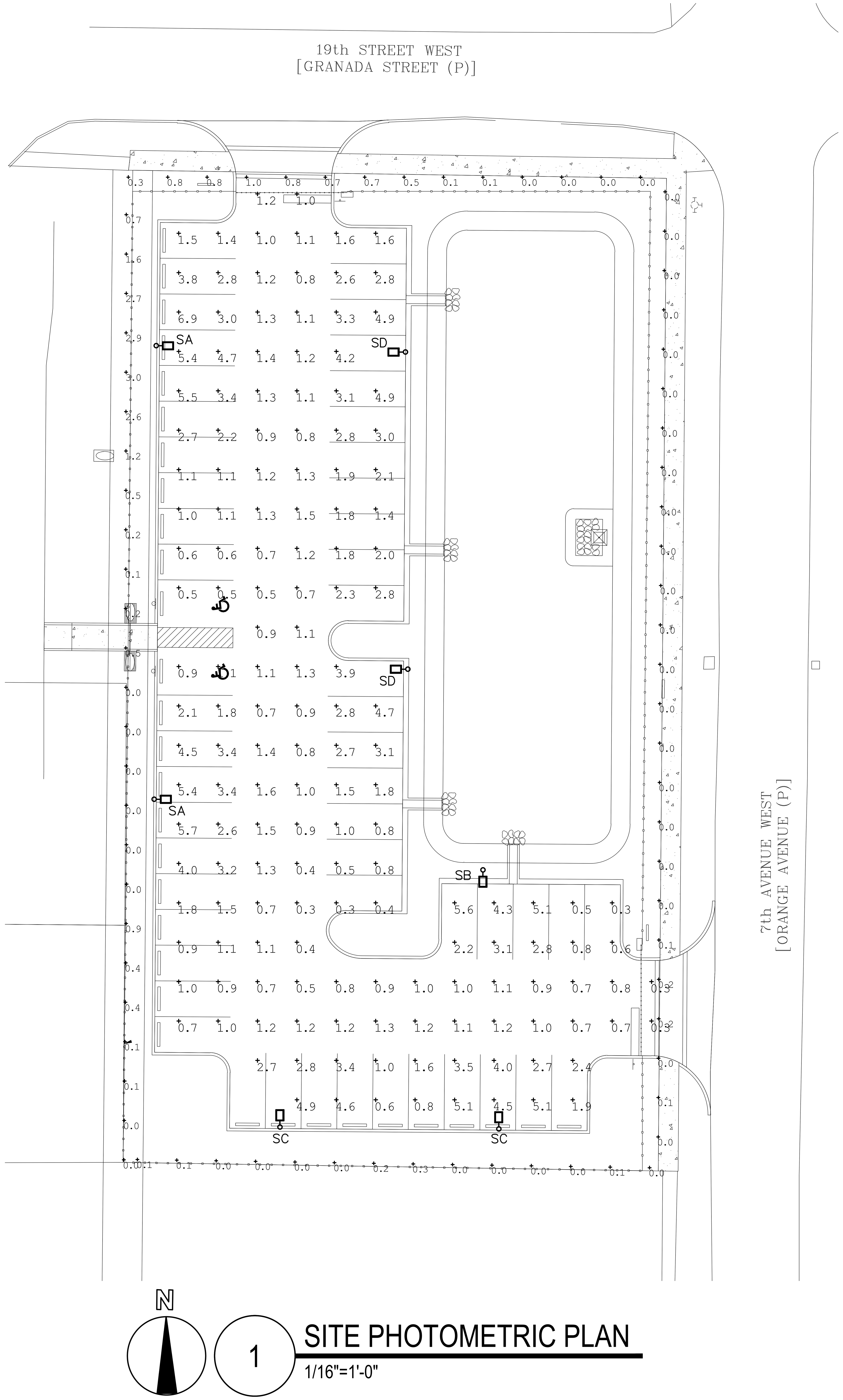
ELECTRICAL LEGEND

E001

100% Construction Documents



SITE PHOTOMETRIC PLAN

1

1/16"=1'-0"

LUMINAIRE SCHEDULE						
SYMBOL	LABEL	ARRANGEMENT	LUMENS	LLF	DESCRIPTION	MOUNTING HEIGHT
o-☐	SA	SINGLE	14000	1.000	MCGRAW GALLERIA MC-GSM-150-MP-3S-662 6 INCH SHIELD ON REAR 6 INCH ON SIDES 2 INCH ON FRONT	16FT AFG
o-☐	SB	SINGLE	14000	1.000	MCGRAW GALLERIA MC-GSM-150-MP-3S-862 8 INCH SHIELD IN REAR 6 INCH SHIELD ON SIDES 2 INCH SHIELD ON FRONT	16FT AFG
o-☐	SC	SINGLE	14000	1.000	MCGRAW GALLERIA MC-GSM-150-MP-3S-1262 12 INCH SHIELD IN REAR 6 INCH ON SIDES 2 INCH ON FRONT	16FT AFG
o-☐	SD	SINGLE	14000	1.000	MCGRAW GALLERIA MC-GSM-150-MP-3S-822 8 INCH SHIELD IN REAR 2 INCH ON SIDES AND FRONT	16FT AFG

CALCULATION SUMMARY								
LABEL	CALC TYPE	UNITS	AVE	MAX	MIN	AVG/MIN	MAX/MIN	DESCRIPTION
PARKING AREA AND DRIVES	ILLUMINANCE	Fc	1.98	6.9	0.3	6.60	23.00	HORIZONTAL PLANE OF CALCULATION AT ZERO FT AFG
PROPERTY LINE	ILLUMINANCE	Fc	0.32	3.0	0.0	N.A.	N.A.	HORIZONTAL LINE OF CALCULATION AT 5 FT AFG

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SITE PHOTOMETRIC PLAN

SL101

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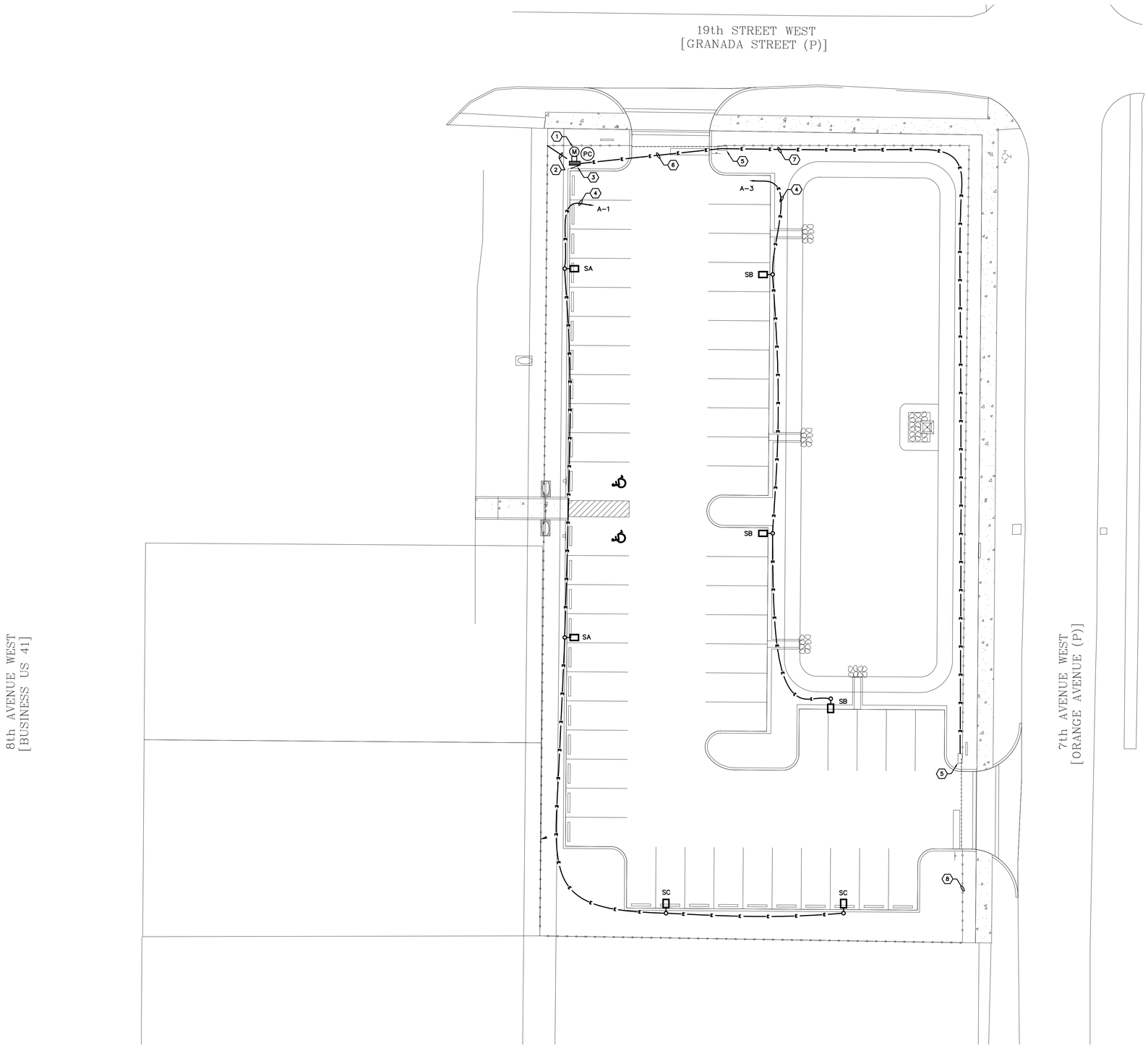

GENERAL NOTES:

1. PROVIDE ALL POWER EQUIPMENT, LIGHTING FIXTURES AND CIRCUITS SHOWN. PROVIDE ALL LABOR, MATERIALS AND EQUIPMENT REQUIRED TO PROVIDE A COMPLETE AND WORKING SYSTEM FOR THE OWNER.

2. SEE LIGHTING CONTROL SCHEDULE FOR DETAILS REGARDING LIGHTING CONTROL FOR ALL SITE LIGHTING CIRCUITS.

3. INSTALL BASE OF POLES NO CLOSER THAN THREE FEET FROM CAR BUMPER BLOCKS (TYPICAL).

4. THE OWNER WILL PAY FOR ALL COSTS FOR THE NEW, PERMANENT ELECTRIC SERVICE AND THE ELECTRICAL CONTRACTOR IS TO EXCLUDE THESE COSTS FROM THE BID. THE GENERAL CONTRACTOR WILL BE RESPONSIBLE FOR THE COSTS AND FOR THE ARRANGEMENT OF TEMPORARY ELECTRIC POWER FOR CONSTRUCTION (IF NEEDED).

5. PROVIDE ONE 1" CONDUIT HOMERUN FROM THE PANELBOARD LOCATION TO EACH POLE LOCATION (TYPICAL) FOR FUTURE SECURITY CAMERA POWER. NOT SHOWN FOR CLARITY.

SITE PLAN KEY NOTES: (#)

KEY NOTES APPLY TO THIS DRAWING ONLY.

1. PROPOSED LOCATION OF NEW UTILITY COMPANY METER, CURRENT TRANSFORMERS, ETC.. COORDINATE EXACT LOCATION WITH OWNER AND UTILITY COMPANY PRIOR TO BID. MODIFY LOCATION AS REQUIRED TO COMPLY WITH UTILITY COMPANY REQUIREMENTS.. REFER TO THE "ELECTRICAL RISER DIAGRAM" FOR ADDITIONAL REQUIREMENTS.

2. PROPOSED ROUTING OF NEW UNDERGROUND SECONDARY SERVICE LATERAL FROM UTILITY COMPANY HAND HOLE/TRANSFORMER(S). COORDINATE EXACT ROUTING WITH GENERAL CONTRACTOR, OTHER TRADES AND EXISTING CONDITIONS PRIOR TO ROUGH-IN. REFER TO THE "ELECTRICAL RISER DIAGRAM" FOR ADDITIONAL REQUIREMENTS.

3. PROVIDE ELECTRICAL EQUIPMENT (PANELBOARDS, DISCONNECT SWITCHES, CONTACTORS, ETC.). REFER TO THE ELECTRICAL RISER DIAGRAM FOR ADDITIONAL ELECTRICAL REQUIREMENTS.

4. PROVIDE CONDUIT AND WIRE TO SITE LIGHTING FIXTURES. PROVIDE 2#8AWG + 1#10AWG EQUIPMENT GROUND COPPER IN 1" CONDUIT U.O.N.. SEE PARKING LOT LIGHTING CONCRETE POLE BASE DETAIL FOR FURTHER INFORMATION.

5. PROPOSED GATE MOTOR OPERATOR. SEE RACEWAY DETAIL FOR OTHER REQUIREMENTS.

6. PROVIDE CONDUIT AND WIRE TO GATE MOTOR OPERATOR. PROVIDE 2#10AWG + 1#10AWG EQUIPMENT GROUND COPPER IN 1" CONDUIT U.O.N.. VOLTAGE DROP IS CALCULATED TO BE 0.60%.

7. PROVIDE CONDUIT AND WIRE TO GATE MOTOR OPERATOR. PROVIDE 2#4AWG + 1#10AWG EQUIPMENT GROUND COPPER IN 1-1/4" CONDUIT U.O.N.. VOLTAGE DROP IS CALCULATED TO BE 1.31%.

8. PROPOSED SIX FOOT HIGH PERIMETER CHAIN LINK FENCE (TYPICAL).

N

1 ELECTRICAL SITE PLAN

1/16"=1'-0"

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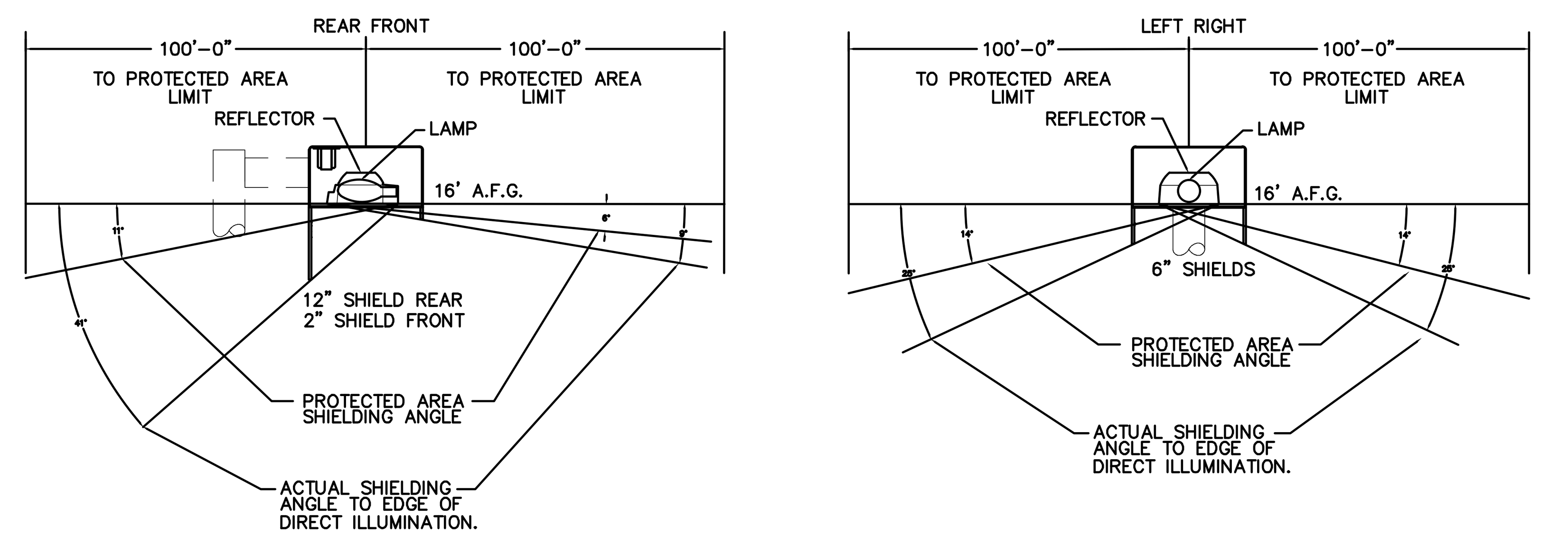
ELECTRICAL
SITE PLAN

ES101

100% Construction Documents

CALCULATIONS BASED ON MCGRAW-EDISON GALLERIA FIXTURE



CALCULATION OF THE DISTANCE TO THE EDGE OF DIRECT ILLUMINATION: REFER TO DETAIL

a – ACTUAL SHIELDING ANGLE OF FIXTURE

D – HORIZONTAL DISTANCE FROM LIGHT SOURCE TO EDGE OF DIRECT ILLUMINATION

H – HEIGHT OF LIGHT SOURCE.

E – ELEVATION DROP FROM LIGHT SOURCE POLE TO EDGE OF DIRECT ILLUMINATION

REAR/FRONT

D = (H+E)/tan a   H=16.0'

D = (16.0'+0.0')/tan 41°   E=0.0'

D = 18.4'   a=41°

COMPLIANCE: D < 100'

REAR/RIGHT/LEFT

D = (H+E)/tan a   H=16.0'

D = (16'+0.0')/tan 25°   E=0.0'

D = 34.3'   a=25°

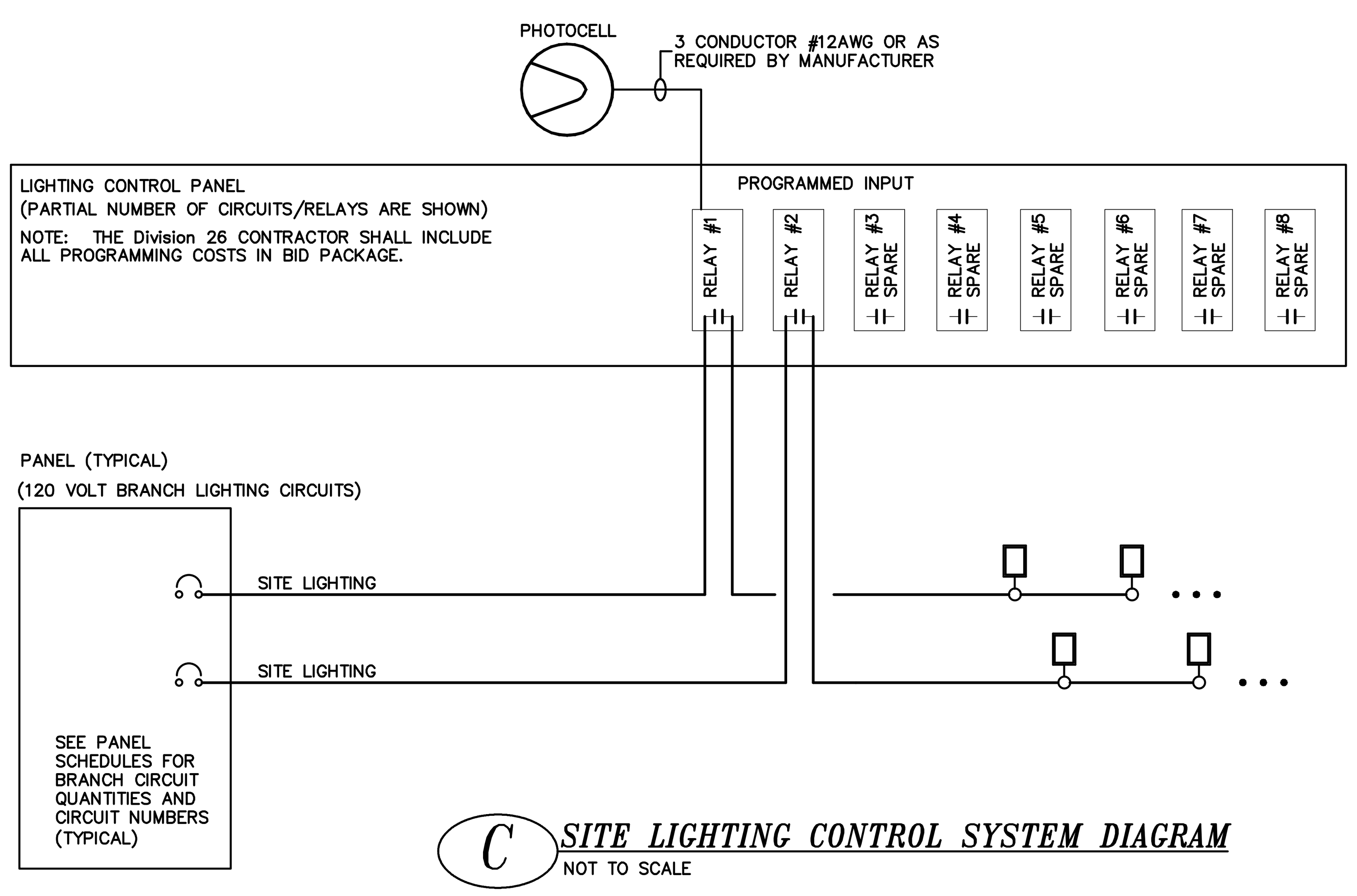
COMPLIANCE: D < 100'

B FIXTURE ILLUMINATION DETAILS – SHIELD ANGLES (FIXTURE SC)
NOT TO SCALE

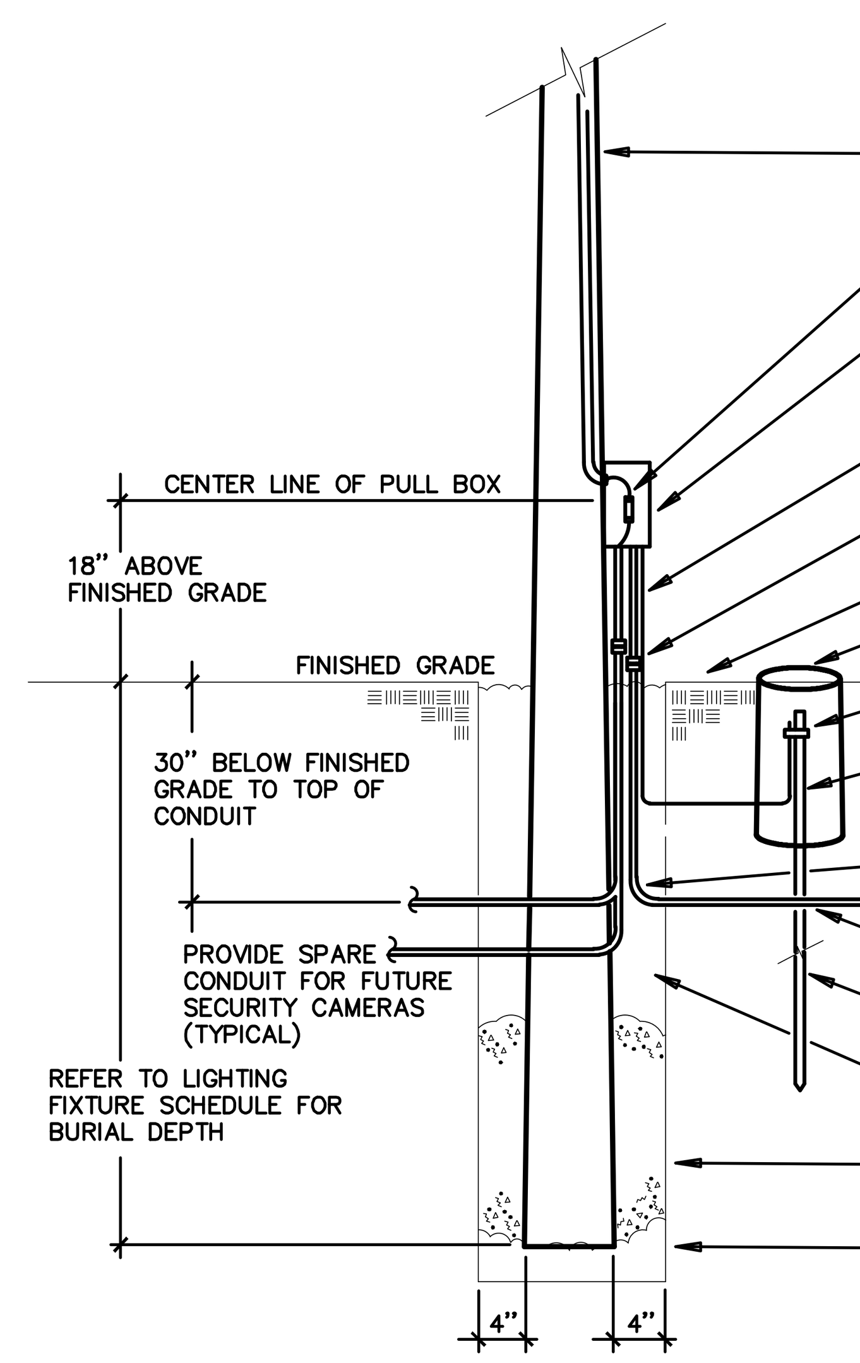
GENERAL NOTES:

A. ALL SYSTEM COMPONENTS SHOWN ARE NEW U.N.O..

B. Division 26 CONTRACTOR TO FIELD VERIFY SHIELD ADJUSTMENT AFTER INSTALLATION.



C SITE LIGHTING CONTROL SYSTEM DIAGRAM
NOT TO SCALE



A DIRECT BURIAL POLE DETAIL
NOT TO SCALE

LIGHTING FIXTURE SCHEDULE – MANATEE COUNTY PALMETTO PARK AND RIDE

FIX. TYPE	DESCRIPTION	MANUFACTURER / CATALOG NUMBER	VOLTS	LAMP INFORMATION QTY	LAMP INFORMATION TYPE	TOTAL INPUT WATTS	SEE SCHEDULE NOTES
SA	PULSE START METAL HALIDE DIE CAST ALUMINUM RECTILINEAR AREA LIGHTING FIXTURE, WET LOCATION LISTED, TYPE IV OPTICS	MCGRAW EDISON GALLERIA– SEE SCHEDULE ON PHOTOMETRIC SHEET FOR CATALOG NUMBER AND SERIES DAY–BRITE EQUIVALENT HUBBELL EQUIVALENT	120	1	150W MH, 4100K BY FIXTURE MANUFACTURER	180W	1,2,3
SB	PULSE START METAL HALIDE DIE CAST ALUMINUM RECTILINEAR AREA LIGHTING FIXTURE, WET LOCATION LISTED, TYPE IV OPTICS	MCGRAW EDISON GALLERIA– SEE SCHEDULE ON PHOTOMETRIC SHEET FOR CATALOG NUMBER AND SERIES DAY–BRITE EQUIVALENT HUBBELL EQUIVALENT	120	1	150W MH, 4100K BY FIXTURE MANUFACTURER	180W	1,2,3
SC	PULSE START METAL HALIDE DIE CAST ALUMINUM RECTILINEAR AREA LIGHTING FIXTURE, WET LOCATION LISTED, TYPE IV OPTICS	MCGRAW EDISON GALLERIA– SEE SCHEDULE ON PHOTOMETRIC SHEET FOR CATALOG NUMBER AND SERIES DAY–BRITE EQUIVALENT HUBBELL EQUIVALENT	120	1	150W MH, 4100K BY FIXTURE MANUFACTURER	180W	1,2,3
SD	PULSE START METAL HALIDE DIE CAST ALUMINUM RECTILINEAR AREA LIGHTING FIXTURE, WET LOCATION LISTED, TYPE IV OPTICS	MCGRAW EDISON GALLERIA– SEE SCHEDULE ON PHOTOMETRIC SHEET FOR CATALOG NUMBER AND SERIES DAY–BRITE EQUIVALENT HUBBELL EQUIVALENT	120	1	150W MH, 4100K BY FIXTURE MANUFACTURER	180W	1,2,3

GENERAL NOTES:

A. FIXTURES PROPOSED AS EQUIVALENT TO SPECIFIED FIXTURES SHALL BE JUDGED ON EFFICIENCY, PERFORMANCE AND CONSTRUCTION, NOT FIXTURE CONSTRUCTION ALONE. THE ENGINEER WILL REQUIRE THE SUCCESSFUL VENDOR TO PROVIDE PHOTOMETRIC RUNS FOR EVALUATION PRIOR TO SHOP DRAWING REVIEW. THE ENGINEER RESERVES THE RIGHT TO REJECT ANY AND ALL FIXTURE EQUIVALENTS BASED ON MULTIPLE SELECTION CRITERIA.

B. FIXTURES SPECIFIED WITH GLASS LENSES OR DIFFUSERS (TYPICALLY FIXTURES WITH H.I.D. LAMPS) SHALL BE PROVIDED WITH GLASS LENSES OR DIFFUSERS. POLYCARBONATE, ACRYLIC, LEXAN, ETC. ARE NOT ACCEPTABLE.

C. LIGHTING FIXTURE SUBMITTAL CUT SHEETS SHALL INCLUDE INFORMATION ON HOW THE FIXTURE CATALOG NUMBER IS COMPILED AND SHALL INCLUDE CUT SHEETS OF ALL OPTIONAL COMPONENTS, SUCH AS INPUT WATTS, BALLAST FACTOR, SHIELD INFORMATION, ETC.

D. PROVIDE H.I.D. WITH A COLD WEATHER BALLAST REGARDLESS OF FIXTURE CATALOG NUMBER NOMENCLATURE.

E. PROVIDE H.I.D. FIXTURES WITH INLINE FUSE(S) LOCATED ON LINE SIDE OF FIXTURE BALLAST REGARDLESS OF FIXTURE CATALOG NUMBER. FUSES FOR POLE MOUNTED LIGHTING FIXTURES SHALL BE LOCATED IN HAND HOLE AT BASE OF POLE.

F. THE ONLY LIGHTING FIXTURE MANUFACTURERS (AND THEIR ASSOCIATED DOWNSTREAM PRODUCT LINES) APPROVED FOR THIS PROJECT INCLUDE DAY–BRITE, COOPER AND HUBBELL LIGHTING. IT WILL BE ACCEPTABLE TO PROVIDE THE FIXTURE EQUIVALENTS FROM THE OTHER TWO LISTED MANUFACTURERS WHERE NOT LISTED ABOVE. HOWEVER, THE ENGINEER RESERVES THE RIGHT TO DETERMINE FIXTURE EQUIVALENTS BASED ON THE CATALOG SERIES AND THE ENGINEER'S JUDGMENT AND MAY REJECT FIXTURES ON THESE GROUNDS.

G. AREA LIGHTING LUMINAIRES SHALL BE EQUIPPED WITH FIELD ADJUSTABLE SHIELDS IN ORDER TO ASSIST WITH BEING IN COMPLIANCE WITH THE MANATEE COUNTY LIGHTING ORDINANCE. THE ENGINEER RESERVES THE RIGHT TO JUDGE THE FIXTURES SUBMITTED AND WILL BE THE FINAL ARBITER AS TO WHICH FIXTURES MAY BE ACCEPTABLE TO THE OWNER. THE LAST THREE DIGITS OF THE CATALOG NUMBER SHOWN ARE THE REAR, SIDE AND FRONT SHIELD DIMENSIONS. FOR EXAMPLE, –862 IS A REAR SHIELD OF 8 INCHES, SIDE SHIELDS OF 6 INCHES AND FRONT SHIELD OF 2 INCHES.

H. THE ELECTRICAL CONTRACTOR SHALL INCLUDE AT LEAST THREE SEPARATE SHIELD ADJUSTMENTS IN THEIR BID PRICE FOR THIS PROJECT.

I. THESE POLE MOUNTED FIXTURES HAVE EXTENSIVE SHIELD CONFIGURATIONS. THESE SHIELDS MAY NEED MULTIPLE ADJUSTMENTS AS REQUESTED BY THE AUTHORITY HAVING JURISDICTION. INCLUDE MULTIPLE FIELD ADJUSTMENTS IN PRICE BID (UP TO FOUR EACH ON SEPARATE OCCASIONS WITHIN 6 MONTHS OF SUBSTANTIAL COMPLETION).

J. ALL EXTERIOR LIGHTING FIXTURES SHALL CONFORM (TO THE GREATEST EXTENT POSSIBLE) TO THE MANATEE COUNTY LIGHTING ORDINANCE 05–37.

SCHEDULE NOTES: (APPLICABLE WHERE REFERENCED)

1. CONFIRM FIXTURE MOUNTING ARM LENGTH WITH ENGINEER PRIOR TO PREPARING SUBMITTALS.

2. PROVIDE 20 FOOT LONG TAPERED CONCRETE POLE FOR A FIXTURE MOUNTING HEIGHT OF 16 FEET ABOVE GRADE. BURY POLE BASE 4'–0" BELOW FINISHED GRADE. PROVIDE POLE TOP PIPE TENON. FIXTURE AND ARM ASSEMBLY SHALL BE RATED TO WITHSTAND 130 MPH WIND SPEED AT IMPORTANCE FACTOR OF 1.15, CATEGORY "C" PER ASCE 7–93. PROVIDE SLIP FITTER WITH MOUNTING ARM. REFER TO DETAILS FOR ADDITIONAL POLE REQUIREMENTS.

3. FINAL COLOR SELECTION BY ARCHITECT (FIXTURE AND POLE).

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ELECTRICAL DETAILS

E501

100% Construction Documents

PANEL A

PANEL: SQUARE-D or SIEMENS	240/120 V, 1 PHASE, 3 WIRE	NEUTRAL BUS AMPACITY: 100%
ENCLOSURE: NEMA-3R	MAINS: 100AMP MAIN CIRCUIT BREAKER	GROUND BUS AMPACITY: 50%
MOUNTING: SURFACE	AIC RATING: 42K	SERVICE ENTRANCE RATED

CKT #	CIRCUIT IDENTIFICATION	LINE 1 VA	LINE 2 VA	DEMAND %	DEMAND VA	BREAKER AMPS	BREAKER POLES	BREAKER POLES	BREAKER AMPS	DEMAND VA	DEMAND %	LINE 2 VA	LINE 1 VA	CIRCUIT IDENTIFICATION	CKT #
1	SITE LIGHTING	720	---	1.25	900	20	1	1	20	0	1.00	---	0	SPARE	2
3	SITE LIGHTING	---	540	1.25	675	20	1	1	20	0	1.00	0	---	SPARE	4
5	SPARE	0	---	1.25	0	30	1	1	30	0	1.00	---	0	SPARE	6
7	SPARE	---	0	1.25	0	25	1	1	30	0	1.25	0	---	SPARE	8
9	GATE OPERATOR	888	---	1.25	1110	20	1	1	30	0	1.25	---	0	SPARE	10
11	GATE OPERATOR	---	888	1.00	888	20	1	1	---	0	1.00	0	---	⇩	12
13	SPARE	0	---	1.25	0	20	2	2	30	0	1.00	---	0	SPARE	14
15	⇩	---	0	1.25	0	---	---	---	---	0	1.00	0	---	⇩	16
17	SPARE	0	---	1.00	0	20	2	2	20	0	1.00	---	0	SPD	18
19	⇩	---	0	1.00	0	---	---	---	---	0	1.00	0	---	⇩	20
	TOTALS:	1608	1428		3573					0		0	0	:TOTALS	

CONNECTED VA LINE 1: 1608
CONNECTED VA LINE 2: 1428

CONNECTED AMPERES: 13
DEMAND AMPERES: 15

3036 :TOTAL CONNECTED VA
3573 :TOTAL DEMAND VA

VOLTAGE DROP CALCULATIONS FROM: FPL HANDHOLE TO: PANEL A

NUMBER OF SETS		WIRE SIZE	LENGTH	Z / 100 FT	Z / 100 CKT FT	TOTAL Z	VOLT DROP	% V.D.	FEEDER SIZED TO HAVE A
1	SET(S) OF	2 CU	20 FEET	0.0400	0.0400	0.0080	0.119	0.05%	VOLT. DROP LESS THAN: 2%

COPPER WIRE SIZE	12	10	8	6	4	3	2	1	1/0	2/0	3/0	4/0
1-PH Z PER 100 FT	0.340	0.220	0.140	0.090	0.060	0.048	0.040	0.032	0.026	0.022	0.019	0.016

COPPER WIRE SIZE	250	300	350	400	500	600	750	1000
1-PH Z PER 100 FT	0.014	0.013	0.012	0.011	0.010	0.009	0.009	0.008

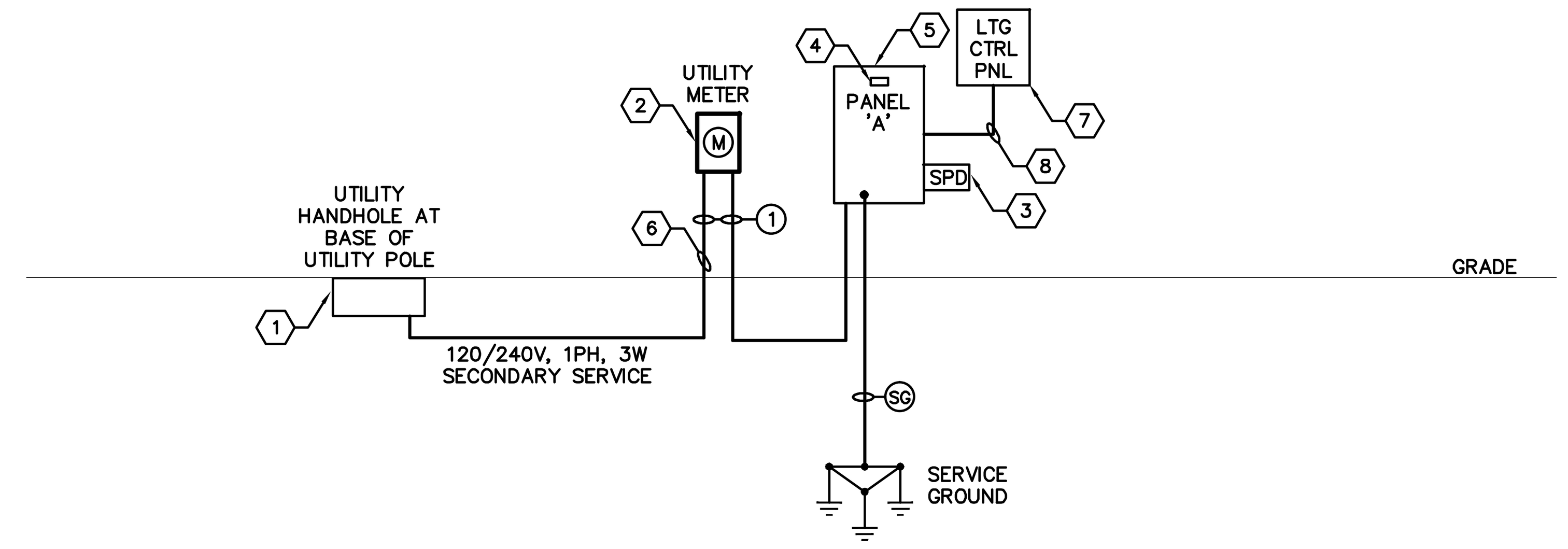
FAULT CURRENT CALCULATIONS FROM: FPL TRANSFORMER TO: PANEL A

NUMBER OF SETS		WIRE SIZE	LENGTH	C	TOTAL C
1	SET(S) OF	2 CU	20 FEET	5907	5907

COPPER WIRE SIZE	12	10	8	6	4	3	2	1	1/0	2/0	3/0	4/0
C FACTOR	617	981	1557	2425	3806	4774	5907	7293	8925	10755	12844	15082

COPPER WIRE SIZE	250	300	350	400	500	600	750	1000
C FACTOR	16483	18177	19704	20566	22185	22965	24137	25278

TRANSFORMER KVA	100	
VOLTAGE L-L	240	
VOLTAGE L-N	120	
TRANSFORMER %Z	1.0	
TRANSFORMER FLC	417	CALCULATIONS ARE PERFORMED USING THE POINT-TO-POINT METHOD.
MULTIPLIER	100	
SHORT CIRCUIT @ UTIL	41667	
F FACTOR	0.29	
MULTIPLIER	0.77	
SHORT CIRCUIT CURRENT	32202	SINGLE PHASE
MOTOR CONTRIBUTION	150	
SHORT CIRCUIT CURRENT	32352	TOTAL



D ELECTRICAL RISER DIAGRAM

NOT TO SCALE

KEY NOTES: ⟨#⟩

1. UTILITY COMPANY SERVICE POINT. SEE SITE PLAN FOR PROPOSED LOCATION. CONTRACTOR SHALL PROVIDE UNDERGROUND SECONDARY SERVICE LATERAL FROM UTILITY HANDHOLE TO SERVICE ENTRANCE EQUIPMENT IN ACCORDANCE WITH THE N.E.C. AND ALL UTILITY COMPANY REQUIREMENTS. PROVIDE LARGER HANDHOLE IF REQUIRED BY UTILITY OR LOCAL AHJ. COORDINATE UTILITY CONNECTION POINT LOCATION AND ALL CONTRACTOR PROVIDED REQUIREMENTS WITH UTILITY COMPANY PRIOR TO BID.

2. PROVIDE 100AMP UTILITY COMPLIANT METER BASE ON CONCRETE METER BANJO ACCORDING TO UTILITY COMPANY GUIDELINES. SEE SITE PLAN FOR PROPOSED LOCATION. MODIFY LOCATION AS REQUIRED TO COMPLY WITH UTILITY COMPANY REQUIREMENTS.

3. PROVIDE 100kA (MINIMUM) SURGE PROTECTION DEVICE (SPD) CLOSE NIPPLED TO EQUIPMENT. PROVIDE LEA DEVICE SP100–120/240. PROVIDE No.10 SOLID INSULATED COPPER CONDUCTORS IN 3/4" CONDUIT BETWEEN "SPD" AND EQUIPMENT. DO NOT EXTEND MANUFACTURERS WIRE LEADS. KEEP LEAD LENGTHS AS SHORT AS POSSIBLE. BRAID ALL LEADS TOGETHER AND BIND WITH TIE WRAPS ON 3" CENTERS (MAX.). COORDINATE QUANTITY OF REQUIRED CONDUCTORS WITH MANUFACTURERS INSTALLATION INSTRUCTIONS AND WIRING DIAGRAMS.

4. PROVIDE ENGRAVED, PLASTIC LAMINATE NAMEPLATE ON ALL PANELBOARDS, CONTROL PANELS, TERMINAL CABINETS, DISCONNECT SWITCHES, EQUIPMENT, ETC. NAMEPLATE SHALL STATE EQUIPMENT NAME AS INDICATED ON THIS DRAWING, AS REQUIRED TO COMPLY WITH OWNERS STANDARD NAMING CONVENTION OR AS REQUIRED BY THE AUTHORITY HAVING JURISDICTION.

5. PROVIDE PANELBOARD.

6. PROVIDE IMC CONDUIT WITH THREADED FITTINGS AND BONDING BUSHINGS FOR ALL CONDUIT ABOVE GRADE (TYPICAL).

7. PROVIDE LIGHTING CONTROL PANEL: INTELLIGENT LIGHTING CONTROLS, LIGHTMASTER 8 WITH 8 RELAYS, NEMA 3R RATED OR GREENGATE LITEKEEPER 8 WITH 8 RELAYS, NEMA 3R RATED OR HUBBELL EQUIVALENT NEMA 3R. IT WILL BE ACCEPTABLE TO PLACE A LIGHTING CONTROL PANEL INSIDE A NEMA 3R ENCLOSURE (BOX IN A BOX) THAT CAN BE LOCKED. INCLUDE FACTORY STARTUP IN BID PRICE. MOUNT PANEL ON STEEL AND CONCRETE SUPPORT STRUCTURE.

8. ROUTE LIGHTING CIRCUITS THROUGH LIGHTING CONTROL PANEL (TYPICAL).

GENERAL NOTES:

A. ALL POWER DISTRIBUTION COMPONENTS SHOWN ARE NEW UNLESS NOTED OTHERWISE (U.N.O.). ALL POWER EQUIPMENT SHOWN (OTHER THAN THE HANDHOLE) SHALL BE INSTALLED INSIDE THE CHAIN LINK FENCE.

B. PROVIDE (DEFINED AS "FURNISH AND INSTALL") ALL LABOR, MATERIALS AND EQUIPMENT REQUIRED TO CREATE A COMPLETE AND PROPERLY OPERATING ELECTRICAL DISTRIBUTION SYSTEM.

C. FLOOR PLANS, RISER DIAGRAM AND SPECIFICATIONS REQUIRE A NEW CODE COMPLIANT POWER DISTRIBUTION SYSTEM.

D. PROVIDE AN EQUIPMENT GROUNDING CONDUCTOR IN EACH CONDUIT TO FORM A CONTINUOUS GROUNDING PATH. CONDUIT SHALL NOT BE USED IN PLACE OF A GROUND CONDUCTOR.

E. PROVIDE INSULATED PLASTIC BUSHINGS ON ENDS OF ALL CONDUIT.

F. REFER TO PANELBOARD SCHEDULE(S) FOR ADDITIONAL ELECTRICAL REQUIREMENTS.

G. PROVIDE LUGGING AT ALL ELECTRICAL GEAR TO MATCH CONDUCTOR SIZING, ETC. SHOWN ON RISER.

FEEDER SCHEDULE

SOME FEEDERS MAY NOT BE USED OR SHOWN ON THE ELECTRIC RISER

(#)⊸ FEEDER NUMBER	FEEDER AMPACITY	NUMBER OF SETS	NUMBER AND SIZE OF PHASE CONDUCTORS PER SET	NUMBER AND SIZE OF NEUTRAL CONDUCTORS PER SET	NUMBER AND SIZE OF GROUND CONDUCTORS PER SET	CONDUIT SIZE PER SET	SEE SCHEDULE NOTES
M	...	... ...	PROVIDE NEW WIRING PER UTILITY CO. REQUIREMENTS	...	...	...	...
SG	...	1	SERVICE GROUND	...	1#6	3/4"	1
1	100 COPPER	1 ...	2#2	1#2	...	2"	...
2	100 COPPER	1 ...	2#2	1#2	1#6	2"	...

GENERAL NOTES:

A. FEEDER AMPACITY AND CONDUIT FILL BASED ON 167 DEGREE FAHRENHEIT TYPE THHW, THW, THWN, OR XHHW INSULATED CONDUCTORS RATED AT 600V UNLESS NOTED OTHERWISE.

B. FEEDERS HAVE BEEN SIZED FOR VOLTAGE DROP AND SPECIFIC DISTANCES. PROVIDE NEW FEEDERS AT THEIR INDICATED LOCATIONS ONLY.

C. PROVIDE UNDERGROUND FEEDERS WITH A WARNING RIBBON PLACED IN TRENCH AT 12 INCHES ABOVE THE UNDERGROUND INSTALLATION. BURY UNDERGROUND FEEDERS, CIRCUITS, ETC. 30 INCHES BELOW FINISHED GRADE TO TOP OF CONDUIT.

SCHEDULE NOTES: (APPLICABLE WHERE REFERENCED)

1. ALL CONCEALED, BURIED OR INACCESSIBLE CONNECTIONS SHALL BE EXOTHERMICALLY WELDED. SEE ELECTRICAL SYMBOL LEGEND FOR ADDITIONAL REQUIREMENTS.

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Designed: B.P.Z. ME3 Job No: 10–0203
Checked: S.T.P. Date: 10/08/2010
Drawn: B.P.Z. C.O.A. 27552

TO THE BEST OF MY KNOWLEDGE, SAID PLANS AND SPECIFICATIONS COMPLY WITH ALL APPLICABLE BUILDING CODES.

BRYAN P. ZAPF, P.E.
FL# 46141

Park And Ride

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Palmetto, FL 34221

Client:

Manatee County Government
1112 Manatee Avenue West
Bradenton, FL 34208

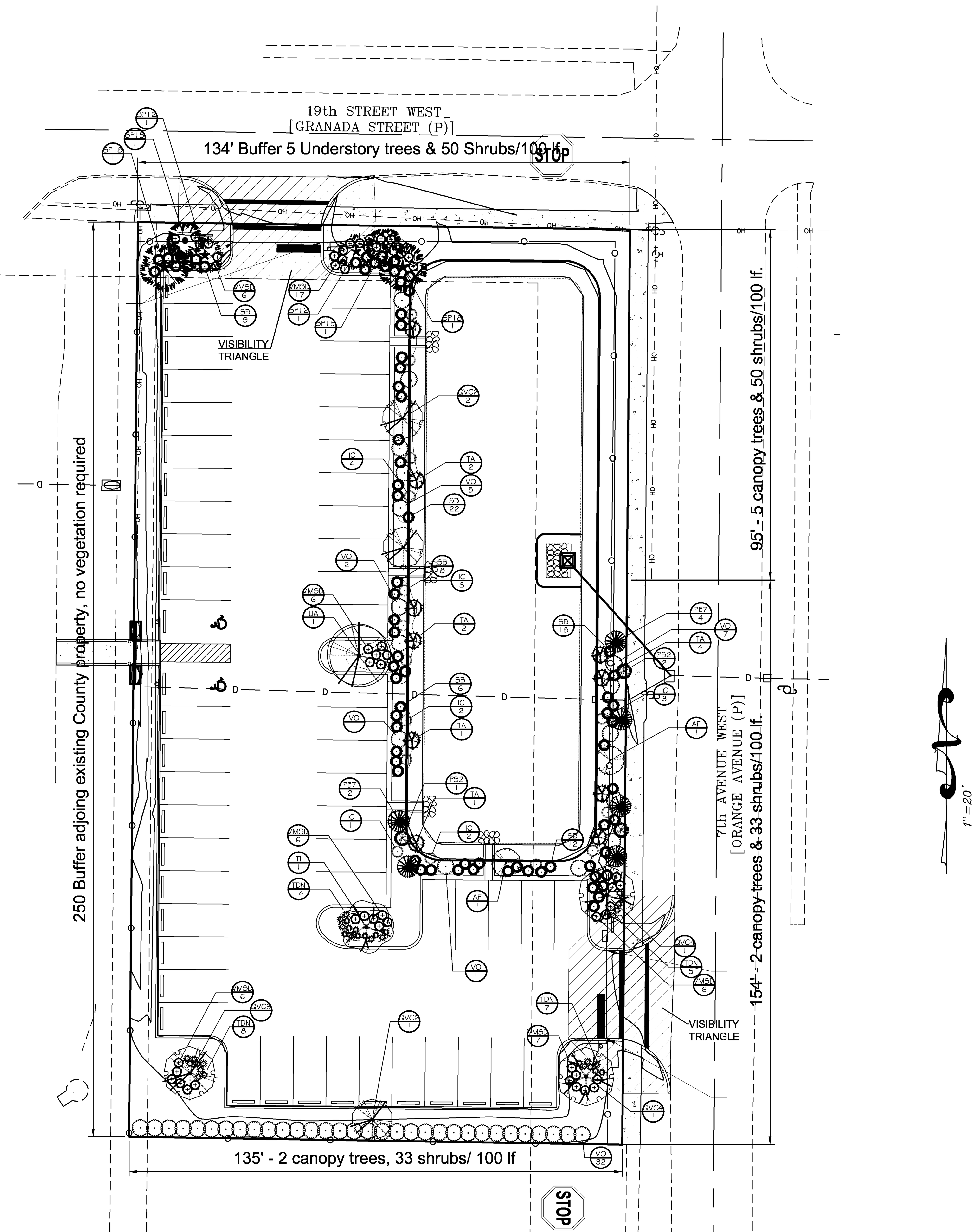
revisions:

drawn: -
checked: -
date: 10.08.2010
comm. no.: 1020805

ELECTRICAL RISER

E502

100% Construction Documents



PLANT SCHEDULE

TREES	CODE	QTY	BOTANICAL NAME / COMMON NAME	CONT	CAL	SIZE	SPD.
	AF	2	Acer rubrum `Florida Flame` / Florida Flame Red Maple 2` ct., CML	10 Gal.	1.5"Cal	7` - 8` Ht.	3`
	IC	15	Ilex cassine / Dahoon Holly Full	3 Gal.	0.5"Cal	3`-4` ht.	1`
	PS2	3	Pinus elliotti / Slash Pine	3 Gal.	0.5"Cal	3` Ht.	1`
	PE7	6	Pinus elliotti / Slash Pine Full	7 Gal.	1.25"Cal	6`-7` ht.	2`
	QVC4	2	Quercus virginiana `Cathedral` / Cathedral Live Oak	100 gal	4"Cal	16` - 18` OA.	8`
	QVC2	3	Quercus virginiana `Cathedral` / Cathedral Live Oak 3` ct., CML	25 Gal.	2.5"Cal	10` Ht.	5`
	QVC3	1	Quercus virginiana `Cathedral` / Cathedral Live Oak 4` ct., CML	45 gal	3"Cal	12` ht.	6`
	TI	1	Tabebuia impetiginosa / Pink Trumpet Tree	25 Gal.	2.5"Cal	10` Ht.	5`
	TA	10	Taxodium distichum `Autumn Gold` / Autumn Gold Bald Cypress Full to base	7 Gal.	1"Cal	7` - 8` Ht.	2`
	UA	1	Ulmus alata / Winged Elm	25 Gal.	2.5"Cal	10` Ht.	5`

PALM TREES	CODE	QTY	BOTANICAL NAME / COMMON NAME	CONT	CAL	SIZE	SPD.
	SP12	2	Sabal palmetto / Cabbage Palmetto	B & B	N/A	12` ct. Hurrican cut	7`
	SP15	2	Sabal palmetto / Cabbage Palmetto	B & B	N/A	15` CT	7`
	SP18	2	Sabal palmetto / Cabbage Palmetto	B & B	N/A	18` ct.	7`

SHRUBS	CODE	QTY	BOTANICAL NAME / COMMON NAME	CONT
	SB	75	Spartina bakeri / Sand Cord Grass Full	3 gal
	TDN	34	Tripsacum dactyloides nana / Dwarf Fakahatchee Grass Full	1 Gal.
	VO	48	Viburnum obovatum / Walter`s Viburnum 24" ht., 18" spd.	3 gal
	VMSD	54	Viburnum obovatum `Miss Shillers Delight` / Small-Leaf Arrowwood 12" ht., 12" spd.	3 gal

LANDSCAPE DATA

FOUNDATION LANDSCAPING (SEC. 715.3.3 LDC)
BUILDING AREA - XX.XX SQ. FT. GFA
REQUIRED FOUNDATION LANDSCAPING = 0 SQ. FT.
(20 sq. ft. / 1000 sf. ft. GFA)
MIN. FOUNDATION LANDSCAPING PROVIDED = 0 SQ. FT.

VEHICULAR USE AREA LANDSCAPING (SEC. 715.3.1 LDC)
TOTAL PARKING SPACES = 55
REQUIRED CANOPY TREES* = 11
(4 TREE / 20 SPACES)
CANOPY TREES PROVIDED* = 11
REQUIRED SHRUBS = 55
(20 3ga. SHRUBS / 20 SPACES)
SHRUBS PROVIDED = 60

ROADWAY BUFFER LINEAR FOOTAGE = 383
REQUIRED CANOPY TREES = 8
(1 Canopy or 2.5 Understory / 50 L.F.)
CANOPY TREES PROVIDED = 9
REQUIRED UNDERSTORY TREES = N/A*
(2.5 Understory / 50 L.F.)
UNDERSTORY TREES PROVIDED = N/A*
REQUIRED SHRUBS = 128
(33 SHRUBS / 100 LF)
SHRUBS PROVIDED* = 131

*NOTES:
1. TREES HAVE BEEN MOVED AWAY FROM OVERHEAD POWER LINES TO ALLOW USE OF CANOPY TREES.
2. 3 GA. TREES HAVE BEEN INCLUDED IN THE SHRUB COUNT.

PERIMETER BUFFER LINEAR FOOTAGE = 385
REQUIRED CANOPY TREES* = 3
(1 TREE / 40 L.F.)
CANOPY TREES PROVIDED* = 4
REQUIRED SHRUBS = 45
(33 SHRUBS / 100 LF)
SHRUBS PROVIDED = 45

NOTES:
1. NO SHRUBS OR TREES REQUIRED ALONG WEST BOUNDARY.
2. LANDSCAPE ISLAND TREES ALONG PERIMETER INCLUDED IN PERIMETER BUFFER QUANTITIES.

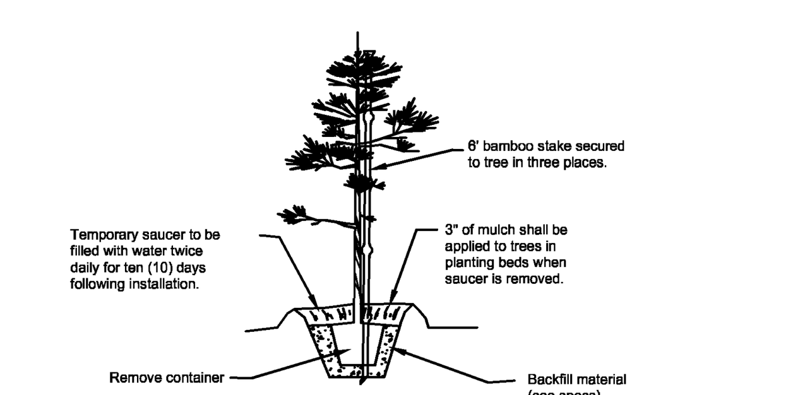
TREE REMOVAL/REPLACEMENT INVENTORY *

TREES TO BE REMOVED FROM OVERALL SITE COMMON AREA, ROADS & SWF'S	4"-15" (1 : 1)	16"-30" (2 : 1)	31"-OVER (3 : 1)
OAKS	0	1	0
PINES	0	0	0
OTHER	1	0	0
TOTAL REMOVED	1	1	0
TOTAL REQUIRED REPLACEMENT TREES	1	2	0

PROPOSED REPLACEMENT TREES = 3
TOTAL NUMBER OF PALMS REMOVED = 1
PROPOSED REPLACEMENT PALMS = 1

REPLACEMENT TREE SIZES:
1 - @ 12' HEIGHT WITH 3" CAL.
2 - @ 14'-16' HEIGHT WITH 4" CAL.
0 - @ 18'-24' HEIGHT WITH 4" CAL.
1 - REPLACEMENT PALMS

ONE 12" CEDAR TREE AND ONE 23" LAUREL OAK WILL BE REMOVED. OTHER TREES ARE ORNAMENTAL (CITRUS) AND CARROTWOOD TREES.

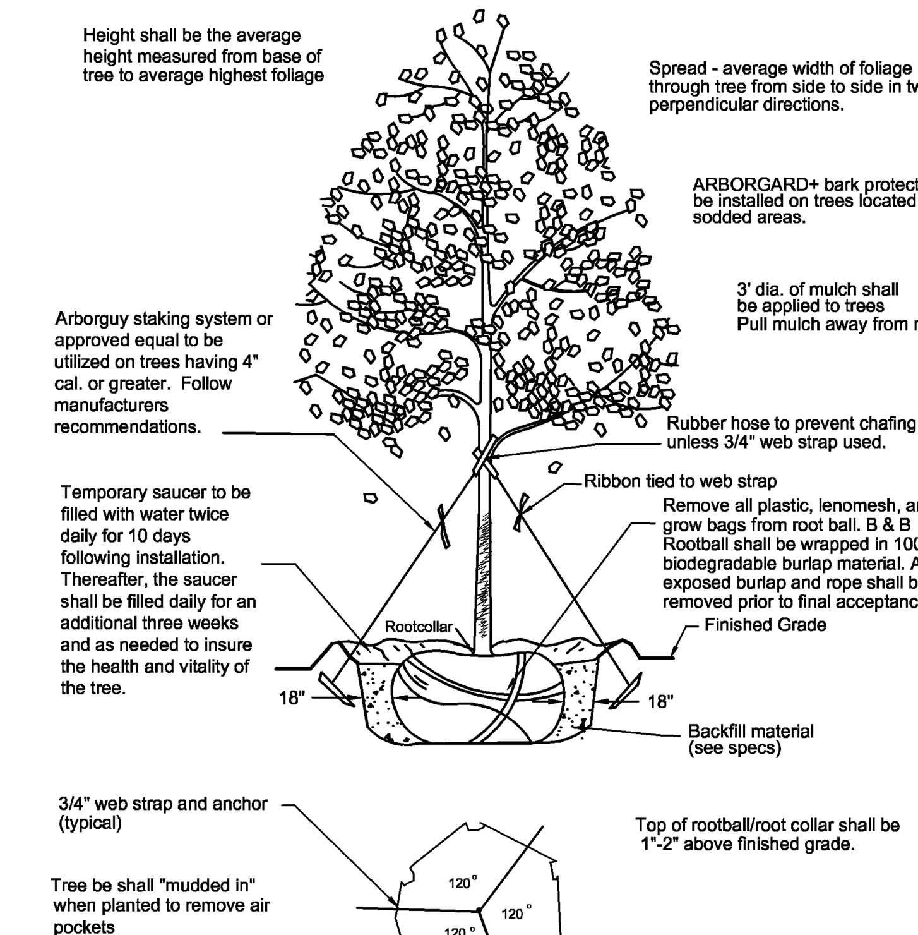


3 GALLON TREE PLANTING DETAIL

NOT TO SCALE

LANDSCAPE NOTES:

1. In the event of variation between quantities shown of the plant list and the plans, the plans shall control. Improvisations made by the Landscape Contractor shall be no cause for additional costs to the owner. Sod, mulch, and topsoil quantity takeoffs shall be the responsibility of the contractor.
2. No substitutions shall be made without the written consent of the Owner or Landscape Architect.
3. Fertilizer shall be applied to all new planting areas at a rate of 1 1/4 lbs. actual nitrogen, 1 1/4 lbs. actual phosphorus, and 1 1/4 lbs. actual potash per 1,000 sq. ft. of planting area. The fertilizer shall also contain all minor trace elements suitable for the area where it is to be used.
4. All shrub bed backfill soil mixtures shall contain 2/3 best of on-site topsoil and 1/3 peat, with 8 oz. of super-absorbent mixed in with each cubic yard. Ph levels within planting beds shall be between 6.5 and 7.5 following plant installation. It shall be the Landscape Contractor's responsibility to achieve the proper ph level.
5. Topsoil material, when called for on the plans, shall be free of sticks, stones larger than 1" dia., plants, or any other debris which would be toxic or otherwise harmful to plant growth. Topsoil should be fertile, friable, and of a naturally loamy character.
6. The Landscape Contractor shall take all necessary precautions to protect all existing structures on the site and shall be held responsible for any damage cause by his operations.
7. It shall be the Landscape Contractor's financial responsibility to prevent plants and trees from falling or being blown over, and to replace all plants which are damaged at no additional cost to the owner for sustained winds of less than 65 MPH.
8. Maintenance shall begin after each plant has been installed and shall continue until final acceptance by the Landscape Architect. Maintenance shall include pruning, mulching, weeding, replacement of sick or dead plants, watering (including cost of equipment such as a water-truck) and any other care which is needed for the proper growth of the plant material.
9. Excess waste material shall be removed daily from the site.
10. All plant materials used shall conform to the standards for Florida No. 1 or better as described in "Grades and Standards for Nursery Plants", State of Florida, Department of Agriculture and Consumer Services, Division of Plant Industry, 2nd edition, Feb 1998 or equal thereto as approved by the Landscape Architect.
11. All shrub beds and hedges shall be top-dressed with 3" of Grade 'B' Pine Bark Nugget mulch unless otherwise stated on the plans or plant schedule. Mulch shall be pulled back 4" from tree trunks and reduced to one inch depth next to woody shrubs.
12. It shall be the responsibility of the Landscape Contractor to coordinate activities with other contractors on the job site.
13. All plant materials shall be fully guaranteed for a period of one (1) year following final acceptance by the owner.
14. Planting beds for hedges shall be 3' wide unless otherwise specified.
15. Unit prices for all plant material shall be provided to the Landscape Architect or Owner upon request.
16. All landscape materials installed within the public right of way shall be installed to meet all State and Local codes and regulations.
17. The Landscape contractor shall not include sod for retention areas into bid (ie. Lake banks and dry retention ponds). This work shall be the responsibility of the general contractor. Sodding of swales shall be the landscape contractors responsibility.
18. Contractor shall install an automatic irrigation system which provides 100% coverage of all landscaped areas, including the tree/shrub buffer as shown on plan.
19. All B & B or Field Grown material (except palms) shall be obtained from "Roots Plus" certified nurseries.
20. All trimming of existing trees shall be conducted or overseen by a certified arborist.
21. Contractor shall contact sunshine state one call of florida system at 1-800-432-4770 for the location of underground utilities/facilities. Contractor shall verify the exact locations of said facilities prior to excavation and shall assume any and all liability for damages which may occur due to the contractor's failure to locate and preserve said facilities.



TREE PLANTING DETAIL

NOT TO SCALE

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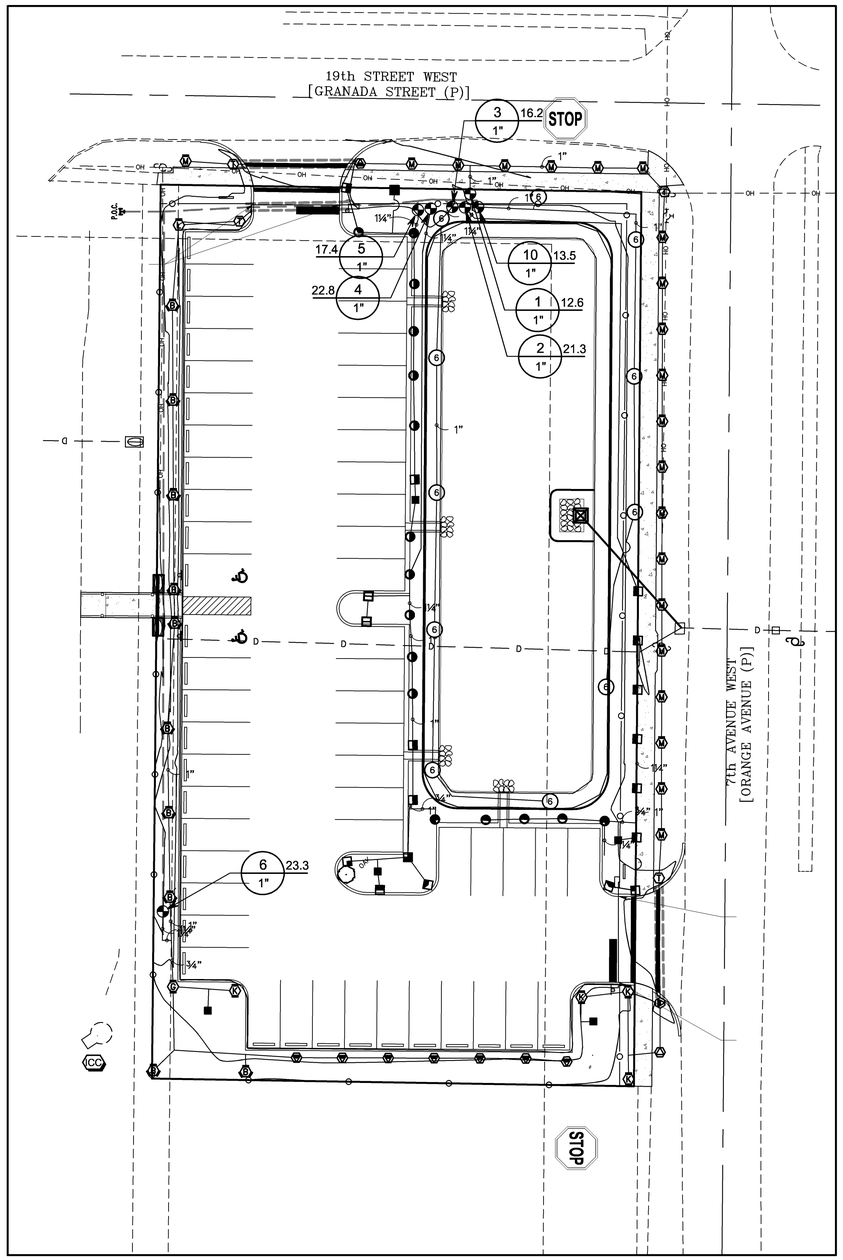
FINAL LANDSCAPE PLAN

L1

100%
Construction Documents



IRRIGATION SCHEDULE

SYMBOL	MANUFACTURER/MODEL/DESCRIPTION	QTY	PSI
Q T H TT TQ F	Toro 570Z-GP 12` radius Turf Spray, 6" popup.	2	30
-	Toro 570Z-GP 15` radius Turf Spray, 6" popup.	17	30
Q T H TT TQ F	Toro 5705 15 Series Shrub Spray, fixed nser.	16	30
M O	Hunter MP1000 w/ MPR40-06-CV Turf Rotator, 6" pop-up with check valve, MP Rotator nozzle. M=Maroon adj arc 90 to 210, L=Light Blue 210 to 270 arc, O=Olive 360 arc, on MPR40 6" pop-up body.	22	40
K G R	Hunter MP2000 w/ MPR40-06-CV Turf Rotator, 6" pop-up with factory installed check valve, MP Rotator nozzle. K=Black adj arc 90-210, G=Green adj arc 210-270, R=Red 360 arc, on MPR40 6" pop-up body.	5	40
B Y A	Hunter MP3000 w/ MPR40-06-CV Turf Rotator, 6" pop-up with factory installed check valve, MP Rotator nozzle. B=Blue adj arc 90-210, Y=Yellow adj arc 210-270, A=Gray 360 arc, on MPR40 6" pop-up body.	10	40
•	Hunter MP Corner w/ MPR40-06-CV Turf Rotator, 6" pop-up with factory installed check valve, MP Rotator nozzle. T=Turquoise adj arc 45-105, on MPR40 6" pop-up body.	4	40
-	Hunter MP Strip w/ MPR40-06-CV Turf Rotator, 6" pop-up with factory installed check valve, MP Rotator nozzle. LST=Ivory left strip, SST=Brown side strip, RST=Copper right strip, on MPR40 6" pop-up body.	10	40
25 50 100 ADJ	Toro 5705-FB-200-ADJ-PC200 Flood Bubbler on shrub nser	5	20

SYMBOL	MANUFACTURER/MODEL/DESCRIPTION	QTY	PSI	GPM	RADIUS
6	Hunter PGP-ADJ, 360 Turf Rotor, 4" popup, adjustable and full circle.	11	50	2.70	38'

SYMBOL	MANUFACTURER/MODEL/DESCRIPTION	QTY
	Irntrol 100P Electric Remote Control Valve, globe/angle configuration	7
CC	Hunter ICC Module Install in the existing Hunter ICC controller located within Palmetto Station	1
P.O.C.	Existing 1 hp. submersible pump Existing well located on Palmetto Bus Station site	1
	Irrigation Lateral Line: PVC Class 200 SDR 21 Only lateral transition pipe sizes 1" and above are indicated on the plan, with all others being 3/4" in size.	1,953 l.f.
	Irrigation Mainline: PVC Schedule 40	305 l.f.
	Pipe Sleeve: PVC Schedule 40 Typical pipe sleeve for irrigation pipe. Pipe sleeve size shall allow for irrigation piping and their related couplings to easily slide through sleeving material. Extend sleeves 18 inches beyond edges of paving or construction.	91 l.f.

Valve Callout
- # — Valve Number
- # — Valve GPM
- #" — Valve Size

CRITICAL ANALYSIS

Generated:	2010-09-13 11:37
P.O.C. NUMBER:01	
Water Source Information:	Existing well located on Palmetto Bus Station site
FLOW AVAILABLE	
Custom Max Flow:	24.00 gpm
Flow Available:	24.00 gpm
PRESSURE AVAILABLE	
Static Pressure at POC:	60.00 psi
Pressure Available:	60.00 psi
DESIGN ANALYSIS	
Maximum Station Flow:	23.34 gpm
Flow Available at POC:	24.00 gpm
Residual Flow Available:	0.66 gpm
Critical Station:	3
Design Pressure:	50.00 psi
Loss Elev. high head to valve:	0.43 psi
Pipe Loss Critical Head:	3.46 psi
Loss Fitting Factor:	0.35 psi
Loss through Valve:	3.58 psi
Pressure Req. at Critical Station:	57.82 psi
Loss for Fittings:	0.02 psi
Loss for Main Line:	0.20 psi
Loss for POC to Valve Elevation:	0.43 psi
Loss for Backflow:	0.00 psi
Critical Station Pressure at POC:	58.47 psi
Pressure Available:	60.00 psi
Residual Pressure Available:	1.53 psi

VALVE SCHEDULE

NUMBER	MODEL	SIZE	TYPE	PSI	PSI @ POC	GPM	HEAD ELEV	VALVE ELEV	PRECIP
1	Irntrol 100P	1"	Turf Rotary	51.48	52.06	12.57	1.00 ft	1.00 ft	0.27 in/h
2	Irntrol 100P	1"	Turf Spray	27.96		21.30	1.00 ft	1.00 ft	0.93 in/h
3	Irntrol 100P	1"	Turf Rotor	57.82	58.47	16.20	1.00 ft	1.00 ft	0.43 in/h
4	Irntrol 100P	1"	Shrub Spray	38.33		22.76	1.00 ft	1.00 ft	0.97 in/h
5	Irntrol 100P	1"	Shrub Spray	25.95	26.61	17.39	1.00 ft	1.00 ft	0.82 in/h
6	Irntrol 100P	1"	Turf Rotary	47.99	49.40	23.34	1.00 ft	1.00 ft	0.25 in/h
10	Irntrol 100P	1"	Turf Rotor	57.28	57.89	13.50	1.00 ft	1.00 ft	0.39 in/h

WATERING SCHEDULE

NUMBER	MODEL	TYPE	PRECIP	IN./WEEK	MIN./WEEK	GAL./WEEK	GAL./DAY
1	Irntrol 100P	Turf Rotary	0.27 in/h				
2	Irntrol 100P	Turf Spray	0.93 in/h	1.50	97	2,066	1,033
3	Irntrol 100P	Turf Rotor	0.43 in/h	1.50	210	3,402	1,701
4	Irntrol 100P	Shrub Spray	0.97 in/h	0.75	47	1,071	1,071
5	Irntrol 100P	Shrub Spray	0.82 in/h	0.75	55	956.5	956.5
6	Irntrol 100P	Turf Rotary	0.25 in/h				
10	Irntrol 100P	Turf Rotor	0.39 in/h	1.50	231	3,119	1,559
		TOTALS:			640	10,614	6,320

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FINAL IRRIGATION PLAN

L2

100%
Construction Documents

EXISTING CONDITIONS

1. **GENERAL**

1.1 The Contractor should visit the site and acquaint himself with all existing conditions. Prior to bidding, bidders may make their own subsurface investigations to satisfy themselves as to site and subsurface conditions.

1.2 Before commencing work, Contractor shall verify all conditions at the job. Report any necessary corrections immediately to the Owner's representative. Do not proceed until corrections (if any are required) are made. Commencing work implies Contractor's acceptance of job conditions.

2. **EXISTING TREES**

2.1 Trees which exist on the site and are designated to remain, shall be protected from damage during site construction. Contractor shall be financially responsible for repair, if possible, or replacement of damaged plants with others of equal size, type, and quantity as necessary to satisfy reviewing agencies and Owner.

3. **MASS GRADING AND FILLING**

3.1 General site grading, filling and establishment of the rough grade 2" below proposed finished grade shall be accomplished by the General Contractor prior to commencement of work under this contract (if applicable).

3.2 The Landscape Contractor shall not begin work in any area until the rough/finished grade has been inspected and approved by the Owner and/or the Landscape Architect.

3.3 **SOIL TESTING**

Results of any soil tests made prior to the beginning of grading are available for use by the Contractor.

4. **LANDSCAPE PLANTING**

4.1 **SCOPE**

Work consists of supplying all labor and materials as needed, import and spread topsoil, finish grading and preparation of areas for sodding and planting, the planting of grass, sod, shrubs and trees, maintenance and all related items as shown on the drawings and in accordance with these specifications.

Coordination with other contractors under parts of the project is required.

Contractor shall be responsible for all inspections of plant material that may be required by State or Federal authorities and securing of Certificates as required.

All plant lists and all material quantities are furnished for the Contractor's convenience only. Contractor shall verify all quantities required for completion of the work and shall be responsible for the supply and installation of all plants and materials indicated on drawings and specifications.

4.2 **SCHEDULING OF WORK**

The work shall be so coordinated with other contractors as to prevent any conflicts as to scheduling with others. Coordination of work with others is required with but not limited to the following:

4.2.1 Coordination between the Landscape Contractor and the Irrigation Contractor to assure availability of water and proper location of irrigation equipment in relation to plants.

4.2.2 Coordination with General and Paving Contractors in regard to completion of structures, paving and curbing, walls, earthwork and site rough grading.

4.2.3 Coordination with Lighting Contractor in regard to location and adjustment of landscape lighting.

4.3 **PERSONNEL**

All planting shall be performed by personnel familiar with accepted planting procedures and under the supervision of a qualified planting foreman.

4.4 **PROTECTION OF UTILITIES AND BUILDING**

Prior to the preparation of planting areas or plant pits, the Contractor shall ascertain the location of all electrical cables, all utility lines, oil tanks and supply lines, so that proper precautions may be taken not to disturb or damage any subsurface improvements. In the event any are uncovered, the Contractor shall promptly notify the Landscape Architect, who shall arrange to relocate the plant material, if possible. The Contractor shall be responsible for any damage to utilities and structures and shall properly maintain the protection of same. The Contractor shall take all necessary precautions to avoid damage to the buildings or other structures while installing planting. The use of equipment within five feet of the building to move plants or materials shall be approved by the Landscape Architect prior to its use. The Contractor shall be responsible for damage to buildings or other structures by his operations.

4.5 **CLEAN UP**

The Contractor at all times shall keep the premises free from accumulation of waste materials or rubbish caused by his operations. At the completion of the work, he shall remove all his waste material and rubbish from and about the project as well as all his tools, construction equipment, machinery and surplus materials, and shall clean all grass surfaces and leave the work "broom clean" or its equivalent. If the Contractor fails to clean up, the Owner may do so and the cost thereof shall be charged to the Contractor and deducted from his final payment.

4.6 **PLANTING GENERAL**

4.6.1 Site Preparation

Upon completion of rough grading by others and results of soil tests, unless deemed unnecessary by Landscape Architect, the entire planting area of site shall be thoroughly disced to the top three inches of existing soil. The soil surface shall be smoothed out and the area completely watered down.

4.6.2 Topsoil

The topsoil used for work under this section shall be cleaned of stones, sticks, plants and other foreign materials before used to prepare planting soil.

Topsoil shall be a natural, fertile, friable loamy sand soil without admixture of subsoil and shall be clean and reasonably free of clay lumps, stones, stumps, roots or similar substances two or more inches in diameter, debris, or other objects which might be a hindrance to planting operation.

Topsoil shall be subject to approval of the Landscape Architect.

Soil shall be Ph value between 6.0 and 7.5 after the admixtures have been added.

4.6.3 Commercial Fertilizers

Fertilizer shall be commercial grade formula 6-6-6. 50% of the nitrogen shall be acid forming derived from natural organics and all potash shall be derived from sulphate forms. Fertilizers shall be a complete product complying with State and Federal laws. Fertilizers shall be in unopened containers which shall bear the manufacturer' s guaranteed statement of analysis, or a manufacturer's certificate of compliance covering analysis. Copies of the Guaranteed Statement of Analysis shall be furnished to the Landscape Architect prior to commencement of work. The following minor elements shall be included: 0.2% ZnO, 0.25% CuO, 4.0% MgO, 2.0% Fe2O3, 0.5% MnO, 0.1% B2O3

Chlorine shall constitute less than 2% of the ingredients.

4.6.4 Plant Material

The words "Plant Materials" or "Plants" refer to and include trees, shrubs, groundcover, grass, or herbaceous materials.

Plant species shall conform to those indicated on the drawings and in the specifications in accordance with Standardized Plant Names, latest edition.

Plants shall be sound, healthy, vigorous, free from plant diseases, insect pests, or their eggs, and shall have healthy normal root systems. Plants shall be nursery grown stock material in containers or freshly dug, balled and burlapped plants. Sabal palms are not required to be B & B, but shall have a root ball meeting required standards.

Plants shall not be pruned prior to delivery except as authorized by the Landscape Architect.

All plants shall have been transplanted or root pruned at least once in the twelve (12) months previous to contract date. Root bound container plants will not be accepted.

Immediately upon selection and approval by Landscape Architect, all major trees shall be completely root pruned at the nursery site and held in that condition for a period of 45 - 60 days. Plants shall not be further dug or transported without approval of Landscape Architect. If standard nursery practice dictates the stripping of foliage of certain species, removal of not more than one-half of foliage shall be conducted at time of root pruning. With the exception of palms, collected plants shall not be used unless authorized in writing by the Landscape Architect.

All plant material not otherwise specified as being Florida Fancy or Specimen shall be Florida No. 1 or better quality graded in accordance with Grades and Standards for Nursery Plants published by the State of Florida, Department of Agriculture. Plants judged to be not in accordance with said standards will be rejected. Caliper measurement, height measurement, height relation to caliper, spread, bare root and ball dimensions, number of canes, types of vines, and groundcovers, etc. shall conform to the applicable standards given in USA Standard For Nursery Stock 260.1, sponsored by the "American Association of Nurserymen, Inc."

Substitutions in plant species or sizes shall be made only after written authorization by the Landscape Architect. Any materials and/or work may be rejected if, in the opinion of the Landscape Architect, such work does not meet the requirements of the Specifications. All rejected materials shall be promptly removed from the site by the Contractor at his expense.

Specimen means an exceptional heavy, symmetrical, tightly knit plant, so trained or favored in its development that its appearance is unquestionably and outstandingly superior in form, number of branches, compactness and symmetry.

Plants used where symmetry is required shall be matched as nearly as possible. The Landscape Architect will inspect these plants in the nursery for tentative approval when matched plants are essential for aesthetic effects.

All plants so indicated on plant list shall be field selected by Landscape Architect at the nursery. When such plants have been located by Contractor, the Landscape Architect shall be notified and the required nursery inspections shall be scheduled.

All plant varieties specified as "patented", "registered", or "trade marked", shall have appropriate identification tag attached to each plant. Tags shall not be removed until inspected and approved by the Landscape Architect.
For any plant variety so indicated on plant list, Contractor shall submit one sample of the plant to the Landscape Architect for approval prior to transporting the total of such plants to the site.

4.7 **PLANTING, GRASS**

4.7.1 Sod

Sod shall be as specified on the plans (if applicable).

All sod shall be of firm texture having a compacted growth and good root development. Sod shall contain no weeds or objectionable vegetation, and be free from fungus, vermin, and diseases. Before being cut and lifted, sod shall be mowed three times with the final mowing not more than a week before cutting into uniform dimensions. Certification as to type of grass and other requirements shall be made and submitted to the Landscape Architect.

4.8 **PLANTING SOIL**

4.8.1 General Site Plantings

Soil used for backfilling around all trees, shrubs and palms shall be as shown on the planting details.

Planting soil backfill mixture shall be prepared using 2/3 approved topsoil from on or off of the site and 1/3 approved Florida Peat. To this mixture add 10 pounds of 6-6-6 fertilizer and 8 oz. of super-absorbent per cubic yard. Thoroughly mix all parts prior to placing in plant pits.

Contractor shall be responsible for adjusting nutrient levels and relative acidity in individual planting areas to properly meet growing requirements of specific plant types. All planting areas are subject to future soil testing to insure that proper cultural conditions have been provided.

4.8.2 All planting soil mixtures required for plant installations shall be considered to be a part of each plant, and the cost thereof shall be included in the unit installed price of individual plants.

4.9 **MISCELLANEOUS MATERIALS**

4.9.1 Mulch

Mulch for tree wells and planting beds shall be pine straw installed as noted in the plant schedule.

4.9.2 Peat Moss

Peat moss shall be imported Sphagnum peat or an approved equal.(if applicable.

4.9.3 Florida Peat

Peat shall be Florida peat specifically pulverized and processed for horticultural use and subject to approval of the Landscape Architect.

4.9.4 Guy Wires

Guys shall be as noted in planting details.

4.9.5 Guy Hoses

Hose for protection of trees from damage by guy wires shall be rubber garden hose in good condition or equal.

4.9.6 Soil Amendments/Lime

Soil amendments shall be approved for horticultural use prior to applying or mixing with soil mixes.

4.10 **SHIPMENT AND DELIVERY**

4.10.1 Contractor shall notify Owner/Landscape Architect, in advance, when plant material is to be delivered.

4.10.2 Plant material shall be protected from weather, adequately packed to prevent breakage and drying out during transit.

4.10.3 Plants shall not be planted on the job until they have been inspected at receiving site, and approved by Owners representative or Landscape Architect.

Legible tags will be attached to at least one plant of each species. Packages, boxes, or bunches of plants will be identified with a similar tag attached. Plants which do not meet specifications for quality herein stated, or plants that show improper handling, or arrive on site in an unsatisfactory condition shall be rejected. Rejected plants shall immediately be removed, disposed of by Contractor, and approved nursery stock of like variety, size, age shall be replaced by him without additional compensation.

4.10.4 Final acceptance of plant material will be given only after material is planted and after meeting requirements prescribed herein.

4.11 **GUYING AND STAKING**

4.11.1 It shall be the Contractor's responsibility to prevent all plants and trees from falling or being blown over, to restraighten and replant all plants which lean or fall and to replace all plants which are damaged.

The Contractor shall promptly guy or stake or otherwise insure proper support to all plant materials in the event winds may exceed 40 miles per hour. Plants blown over by sustained high winds of up to 65 miles per hour shall not be cause for additional expense to the Owner, but shall be the responsibility of the Contractor. Any such damaged plants shall be replaced by the Contractor at no additional expense to the Owner. Contractor shall not be responsible for damage due to sustained winds in excess of 65 miles per hour (i.e. Tropical storm).

4.11.2 When guying and staking are provided by the Contractor, it shall be in accordance with local standard acceptable nursery practice, and as specified in Contract Documents and plans.

4.12 **PLANTING OF LAWN AREA**

4.12.1 Sodding

Under this section of these specifications, the Contractor shall perform the preparation of the areas to be sodded as hereinafter specified.

The Contractor shall smooth out all areas to establish an even grade for sod planting all areas.

Topsoil shall be evenly worked to a depth of 4" taking care to remove all rocks or other foreign material 1" or greater in all areas to be sodded.

Surface shall be rolled with a hand roller weighing not more than 100 pounds per foot of width. During the rolling, all depressions caused by settlement or rolling shall be filled with additional topsoil and the surface shall be regraded and rolled until presenting a smooth and even finish. All weeds shall be removed from topsoil prior to sodding.
Treatment of weeds with a herbicide shall not constitute removal unless performed 7 days prior to sodding and in accordance with manufacturer's instructions.

Water to a depth of 6" before planting. Sod panels shall be laid tightly together so as to make a solid lawn area. Immediately following sod laying the lawn areas shall be rolled with a lawn roller customarily used for such purposes and then thoroughly watered immediately. During delivery, prior to, and during the planting of the lawn area, the sod panels shall at all times be protected from excessive exposure of the roots to the sun. All sod shall be staked during construction and planting so as not to be damaged by sweating or excessive heat and moisture.

a) Top of sod shall be even with all abutting curbs and walks after placing and rolling.

b) Sod shall be thoroughly watered to prevent fertilizer from burning sod and to insure good healthy growth of grass.

4.12.2 Sodding of Sports Fields

Under this section of these specifications, the Contractor shall perform the preparation of the sport field areas to be sodded with certified Bermuda 419.

The Contractor shall apply a two inch layer of loamy sand topsoil to establish final grade. Topsoil shall be fumigated with "vapam" two weeks prior to sodding to eliminate weeds and other undesirable contaminants.

Remove all rock and other foreign material 1" or greater in any dimension from the topsoil to a depth of 4" prior to installing the required 2" layer of topsoil.

Sod shall be placed, rolled, fertilized, and watered in accordance with Section 4.12.1 above.

4.12.3 Survival

Satisfactory survival of sod will be evidenced when the grass produces new leaf growth.

4.12.4 Sport Field Clay

Clay for ball fields shall be supplied and installed by Manatee County Parks and Recreation.

4.13 **PLANTING OF TREES AND SHRUBS**

4.13.1 Except as otherwise specified, the Contractor's work shall conform to accepted horticultural practices as used in the trade.

4.13.2 Plants shall be protected upon arrival at the site by being thoroughly watered and properly maintained until planted. Plants shall not remain unprotected for a period exceeding 24 hours. At all times workmanlike methods customarily in good horticultural practice shall be exercised.

4.13.3 Before digging of holes or beds, the location and/or arrangement of the planting shall be staked by the Contractor and approved by the Landscape Architect except where otherwise stated on the contract drawings.

4.13.4 The existence and location of underground utilities, if shown on the plans, are not guaranteed and shall be investigated and verified in the field by the Contractor before starting work. Excavation in the vicinity of existing structures and utilities shall be carefully done. The Contractor shall be held responsible for any damage to, and for maintenance and protection of, existing utilities and structures.

4.13.5 All tree pits shall be excavated to sizes and depth in accordance with the USDA Standard For Nursery Stock 260.1 unless shown otherwise on the drawings and backfilled with the prepared planting soil mixture as specified under Section 4.8 of these specifications. The Contractor shall test fill all tree pits with water before planting to assure proper drainage percolation is available. Pits which are found not to be adequately draining shall be excavated to a depth sufficient for drainage and backfilled with coarse sand. No allowances will be made for plants lost due to improper drainage.

4.13.6 All shrub, groundcover beds and landscape islands shall be excavated or amended as a unified area to a depth of 6" and backfilled with specified planting soil mixture. Individual plant pits will not be acceptable in bedded areas.

4.13.7 The plants shall be set on prepared planting soil backfill brought to a height permitting planting at the same depth the plants grew in the nursery. Upright plants shall be kept in a vertical position. All plants shall be handled by earth ball only. Handling by the plant itself will be cause for rejection of such plants.

4.13.8 After placing the plant in the pit, the backfill shall be watered and firmly tamped to insure backfill mixture in and about all the roots. All tamping shall be such that no plants will settle lower than the depth above specified.

4.13.9 After filling half way on the earth ball, the burlap and any wire or rope, if applicable, shall be loosened and laid back off the top of the ball, or if too bulky cut away and removed, after which the balance of the pit shall be backfilled and tamped.

4.13.10 All plants shall be thoroughly watered at the time of planting and kept adequately watered until time of acceptance. The Contractor shall provide the means where water lines are not available.

4.13.11 Mulch shall be placed between and around specified trees and all shrubs within 24 hours after any planting and shall be indicated or noted on drawings. For individual plants, the mulch shall be spread to cover the saucer area. When in place, the mulch is to be watered thoroughly. All weeds shall be removed from the planting area prior to installation of mulch. Treatment of weeds with a herbicide shall not constitute removal.

4.13.12 Pruning shall be done at the time of planting and with due regard to the natural form and growth characteristics of each species. Method and amount of pruning shall be determined by the Landscape Architect. Trees with pruned terminal leaders will not be accepted.

4.13.13 On trees, after filling half-way on the earth ball, a minimum three (3) ounces of superabsorbent per 2" caliper shall be added to all tree pits around the earth ball and watered in. The contractor shall excavate a maximum of five (5) separate trees at the Landscape Architect for the purpose of verification of use of superabsorbent and other soil amendments. If visible evidence of proper use of the amendments are not found, the contractor shall immediately excavate to a depth of 12" around all trees already in place, add the proper amounts of Terra-Sorb AG superabsorbent and other amendments and water them in thoroughly prior to backfilling. There will be no exceptions. If a follow-up inspection reveals no evidence that the soil amendments have been installed, the contractor may be fined up to $25.00 per tree installed.

4.13.14 During the course of planting, excess and waste materials shall be removed daily. All reasonable precautions shall be taken to avoid damage to all structures and plants. When planting in an area that has been completed, the area shall be thoroughly cleaned up.

4.14 **MAINTENANCE PRIOR TO INSPECTION FOR ACCEPTANCE**

4.14.1 Maintenance shall begin immediately after each portion of seeding and sodding is executed and each plant is planted and shall continue in accordance with the following requirements.

a) Sodded And Seeded Areas

The Contractor shall be held responsible for maintenance of sodding and seeded area, including watering, weeding, mowing, and replanting as necessary to establish a uniform stand of the specified grasses and until acceptance. After the grass has started, all areas and parts of areas which fail to show a uniform stand of grass, for any reason whatsoever, shall be replanted, repeatedly if necessary, until all sodded areas are covered with satisfactory growth of grass and seeded areas show healthy, vigorous growth.

b) Shrub, Groundcover & Annual Beds

Plant maintenance shall include thorough watering, pruning, weeding, cultivating, mulching, tightening and repairing of guys, replacement of sick or dead plants, resetting plants to proper grades or upright position, and restoration of the planting saucer, and all other care needed for proper growth of the plants. If planting is done after lawn preparation, proper protection of lawn areas shall be provided and any damage resulting from planting operations repaired promptly.

c) Spraying And Dusting

During the maintenance period and until the issuance of certificate of final acceptance, the Contractor shall do all seasonal spraying and/or dusting of trees & shrubs. The materials and methods shall be in accordance with highest standard nursery practices and as recommended by the County Agent.

d) Protection

Newly installed planting areas and trees shall be protected against accidental trespass and damage. If any plants become damaged or injured they shall be treated or replaced as directed. No work shall be done within or over planting areas or adjacent to plants without proper safeguards and protection.

e) Damage resulting from erosion, gullies, washouts, or other causes, shall be repaired by filling with topsoil, tamping, refertilizing, reseeding and/or resodding by the Contractor at his expense if such damage occurs prior to final acceptance by the Landscape Architect.

4.15 **INSPECTION FOR ACCEPTANCE**

4.15.1 Upon completion of all planting, an inspection for acceptance of work will be held. The Contractor shall notify the Landscape Architect for scheduling of the inspection ten (10) days prior to the anticipated inspection date. The Landscape Architect will decide if work is ready for inspection and will establish the time and date of inspection and notify all concerned parties to be present.

4.15.2 At the time of the acceptance inspection, if the materials are in whole or substantially acceptable a written notice will be given by the Landscape Architect to the Contractor that the final maintenance period and the guarantee period begins from the date of inspection.

4.16 **MAINTENANCE AFTER INSPECTION FOR ACCEPTANCE**

4.16.1 The Contractor shall maintain all grass areas and plant materials for a period of thirty (30) calendar days from the date of acceptance.

4.16.2 All maintenance outlined under Paragraph 4.14 above shall be performed during this period.

4.16.3 Prior to the expiration of the maintenance period, Contractor shall furnish to the Owner a schedule of all operations recommended for future maintenance of the site.

4.16.4 Inspection of the landscape work to determine completion of contract work, exclusive of the possible replacement of plants, will be made by the Landscape Architect at the conclusion of the 30 day maintenance period upon written notice requesting such inspection submitted by the Contractor at least 10 days prior to the anticipated date.

4.16.5 Acceptance

After inspection, the Contractor will be notified in writing by the Landscape Architect of acceptance of all work of this section exclusive of the possible replacement of plants subject to guarantee or, if there are any deficiencies of the requirements for the completion of the work. Lawn maintenance or other work remaining to be done shall be subject to reinspection before acceptance.

4.16.6 In case of substantial number of plants are sickly or dead at the time of inspection, acceptance will not be granted and the Contractor's responsibility for maintenance of all the plants shall be extended until replacements are made. Replacements shall conform in all respects to the specifications for new plants and shall be planted in the same manner.

4.17 **PLANT GUARANTEE AND REPLACEMENT**

4.17.1 Guarantee

Plants shall be guaranteed for a period of one (1) year after the date of inspection for acceptance under Paragraph 4.15 above, and shall be alive and in satisfactory growth at the end of the guarantee period.

4.17.2 Replacement

Until the end of the guarantee period, inspection may be made by the Landscape Architect. Any plant required under this contract that is dead or not in satisfactory growth, as determined by the Landscape Architect, shall be removed from the site; these and any p

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Client:
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1112 Manatee Avenue West
Bradenton, FL 34208

drawn: RCG/MF
checked: R.GAUSE
date: 10.08.2010
comm. no.: 1020805

LANDSCAPE SPECIFICATIONS

L3

100%
Construction Documents

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SECTION 3 - TECHNICAL SPECIFICATIONS

IRRIGATION

1. **CONDITIONS:**

1.1 The Contractor shall be responsible for adjusting head location, type, size and any other system components to comply with the requirements of landscaping as actually installed. Such adjustments shall be made at no cost to the Owner except for, when authorized in writing, such adjustments will be compensated at unit prices indicated in the proposal.

1.2 The Contractor shall be responsible for constructing the system in complete accordance with all local codes, ordinances, and laws. Any modifications made to conform with said codes, laws, and ordinances shall be completed at the Contractor's expense with no additional compensation allowed.

2. **SAFETY PROVISIONS:**

2.1 It shall be the responsibility of the Contractor to protect all persons from injury and to avoid property damage. Adequate warning devices shall be placed and maintained during the progress of the work. It shall be the Contractor's responsibility to conform to all local, state, and federal safety laws and codes including the Federal Occupational Safety and Health Act (O.S.H.A.).

3. **EXISTING UTILITIES:**

3.1 Temporary support, adequate protection and maintenance of all underground and surface utilities, structures, drains, sewers and other obstructions encountered in the progress of the work shall be furnished by the Contractor solely at his expense.

3.2 Where the grade or alignment of the pipe is obstructed by existing utility structures such as conduit, ducts, pipe branch connections to sewer mains, main drains, water services, etc., the obstruction shall be permanently supported, relocated, removed, or reconstructed by the Contractor in cooperation with the Owner of such utility. No deviation from the required line or grade shall be made without the written direction of the Landscape Architect.

3.3 Thrust blocking shall be installed for all pipe line fittings, bends and valves installed with compression "Ring-Tite" joints. The minimum thrust block area shall be one (1) square foot in the thrust-absorbing direction, with the minimum total volume of blocking to be one (1) cubic foot of 2,000 p.s.i. concrete. Thrust blocking shall also be utilized for all main line bends or other bends or fittings where prudent.

4. **PIPE INSTALLATION:**

4.1 In all cases, the installation of the irrigation system piping shall strictly conform to the manufacturer's recommendations.

4.1.1 Excavation shall be unclassified and shall include all materials whatsoever encountered in the excavation of trenches for pipe installation. The trench shall be of sufficient width and depth for installation of the pipe as indicated herein. The Contractor shall cause minimum disturbance to all existing conditions wherever possible; the Contractor shall bore under existing pavement and sidewalks rather than cut and restore. No pavement shall be cut without the Owner's written permission.

4.1.2 Pipe shall be delivered and stored on the jobsite with suitable protection against any damage to pipe and fittings.

4.1.3 The pipe and fittings shall be carefully inspected before installation in the trench. All rocks and unsuitable bearing material shall be made in strict accordance with the manufacturer's recommendations.

a. Compression Joints: The bell end shall be dry and shall have the proper compression ring installed without lubricant and in the proper position. The spigot end shall be clean and lubricated with the recommended lubricant. The spigot end shall then be pushed 'home' as indicated when the manufacturer's reference mark is flush with the end of the bell. The completed joint will then be carefully laid in the trench.

b. Solvent welded joints shall be made only on clean, dry, square cut, smooth pipe sections. The fitting shall be 'dry' tested for proper size before solvent is applied. The assembly shall proceed in strict accordance with recommended procedures furnished by the manufacturer.

4.1.4 Pipe trench depths shall be as follows:

Main lines - 12" - 18"
Laterals - 7" - 12"

4.2 Gate Valves 2-1/2" or less in size shall be as specified on the plans.

4.3 Vacuum Breakers shall be as required by local codes.

4.4 Automatic solenoid control valves shall be as specified on the plans. The valve shall have a slow closing feature, and manual bleed with pet cock for manual operation installed. All valves shall have a manual flow control adjustment.

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4.5 All automatic control valves shall be installed as shown on the detail for such valves and per manufacturer's specification. Once installed and wired to the controller, the Contractor shall adjust the flow controller on each valve to provide the proper flow rate and pressure on the downstream side of each valve. The control valve for mist sprinkler head sections shall be adjusted to provide approximately 30 p.s.i. dynamic pressure downstream with all heads operating. The solenoid control valve for rotary spray head sections shall be adjusted to provide approximately 30 p.s.i. dynamic pressure downstream with all heads operating.

5. **SPRINKLER HEADS:**

5.1 All sprinkler heads shall be furnished, installed, and operated in accordance with the plans and these Specifications. Installation shall comply with details set out herein. The Contractor shall guarantee all sprinklers and components for not less than one (1) year from installation warranting against all defects in normal material or workmanship.

5.2 The Contractor shall be responsible for the exact location of all sprinkler heads, acknowledging that the plans are schematic in nature. The Contractor shall accordingly place all sprinkler heads, adjust all nozzles, spray patterns and make whatever other adjustments that may be required to give the landscaped areas full, complete and proper coverage and distributions. The Contractor shall make all such adjustments and additions solely at his expense.

5.2.1 Pop-up Spray heads shall be as shown on the plans. Nozzle shall automatically rise 4" for operation, and shall self-retract. Construction shall be entirely of non-corroding materials, and shall be suitable for operations

5.2.2 Controllers shall be contained in lockable cabinets and located on structures as directed by Architect.

5.3 Control wiring shall be as specified by controller manufacturer. The wiring shall be installed in accordance with these plans and the manufacturer's recommendations.

5.4 All controllers shall include a provision for system override by automatic moisture sensing devices.

5.5 All valve programming shall exactly follow the valve sequence as indicated on the plans. No deviation shall be made without the Landscape Architect's approval. Initial station tuning shall be in accordance with the Landscape Architect's instructions.

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6. **OTHER IRRIGATION EQUIPMENT:**

6.1 The Contractor shall furnish and install all other irrigation equipment called for herein and on the plans in complete accordance with these specifications and details shown on the plans.

6.2 Valves, including remote control valves, manual control valves, gate valves, globe valves and pressure reducing valves shall be installed in a valve access box.

6.3 At the end of the test period, the piping system shall be "blown-off" at the point most distant from the test pump.

6.4 The acceptance of a piping section because of its passing pressure and leakage tests in no way relieves the Contractor of his responsibility for the piping. At any time during the construction or the warranty period, the Landscape Architect or Owner may order subsequent tests. Such tests and any repairs required shall be solely at the expense of the Contractor.

6.4.1 As an exception to the above testing requirements, all constant pressure main lines upstream from automatic control valves including pump station shall be pressure tested at 125 p.s.i. and shall be allowed leakage as follows:

$$\text{Allowable Leakage} = \frac{L = ND\sqrt{P}/2}{3700}$$

Where L= Gallons per hour
N= Number of joints in test main
D= Pipe diameter (nominal)
P= Average test pressure

6.5 Periodic inspections shall be scheduled by the Contractor as the work progresses. At such time the Landscape Architect shall inspect all work for complete conformance with these specifications. The Landscape Architect shall make any additional inspections that he may deem necessary.

6.6 Generally, inspections should be requested by the Contractor whenever any subsurface system is complete and ready for backfill, so that the Engineer may inspect completely that system without causing excavation of the system, which would be solely the expense of the Contractor.

6.7 Periodic inspections shall include the examination of sprinkler location placement and the conformance of such placement to the actual in-place landscaping requirements. Any relocation required will be ordered by the Landscape Architect and carried out by the Contractor at no additional costs.

7. **AS-BUILT DRAWINGS:**

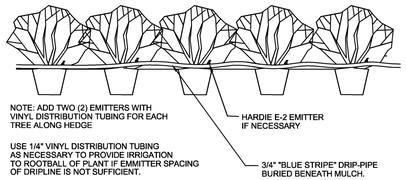
7.1 During the course of irrigation installation, Contractor shall prepare a reproducible set of as-built drawings for the entire system.

7.2 Said drawings shall be kept updated to show the accurate locations of all underground piping, valves, etc. that have been installed.

7.3 Upon completion of construction, the Contractor shall furnish the completed original drawings and one set of prints to the Owner, and one set of prints to the Landscape Architect.

8. **WARRANTY PERIOD:**

8.1 The entire irrigation system shall be fully guaranteed for parts and labor by the irrigation contractor for a period of one year following final acceptance by the owner or Landscape Architect. This warranty shall be extended to cover individual irrigation components which have longer manufacturer's warranties.



HEDGE IRRIGATION DETAIL
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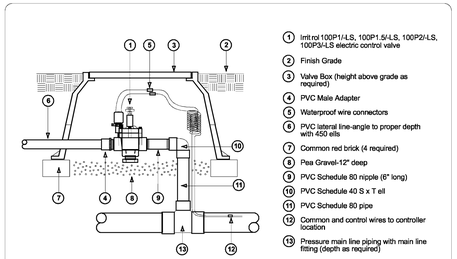
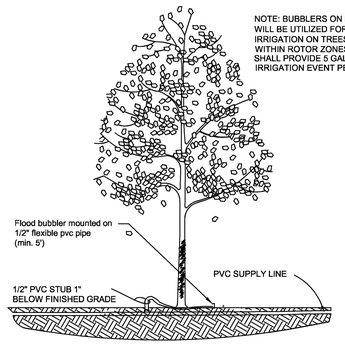


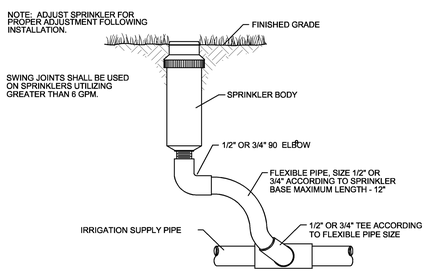
IRRIGATION SCHEDULE

SYMBOL	MANUFACTURER/MODEL/DESCRIPTION	QTY		PSI			
Q T H TT TQ F	Toro 570Z-6P 12` radius Turf Spray, 6" popup.	2		30			
-	Toro 570Z-6P 15` radius Turf Spray, 6" popup.	17		30			
Q T H TT TQ F	Toro 5705 15 Series Shrub Spray, fixed riser.	16		30			
M O	Hunter MP1000 w/ MPR40-06-CV Turf Rotator, 6" pop-up with check valve, MP Rotator nozzle. M=Maroon adj arc 90 to 210, L=Light Blue 210 to 270 arc, O=Olive 360 arc, on MPR40 6" pop-up body.	22		40			
K G R	Hunter MP2000 w/ MPR40-06-CV Turf Rotator, 6" pop-up with factory installed check valve, MP Rotator nozzle. K=Black adj arc 90-210, G=Green adj arc 210-270, R=Red 360 arc, on MPR40 6" pop-up body.	5		40			
B Y A	Hunter MP3000 w/ MPR40-06-CV Turf Rotator, 6" pop-up with factory installed check valve, MP Rotator nozzle. B=Blue adj arc 90-210, Y=Yellow adj arc 210-270, A=Gray 360 arc, on MPR40 6" pop-up body.	10		40			
•	Hunter MP Corner w/ MPR40-06-CV Turf Rotator, 6" pop-up with factory installed check valve, MP Rotator nozzle. T=Turquoise adj arc 45-105, on MPR40 6" pop-up body.	4		40			
-	Hunter MP Strip w/ MPR40-06-CV Turf Rotator, 6" pop-up with factory installed check valve, MP Rotator nozzle. LST=Ivory left strip, SST=Brown side strip, RST=Copper right strip, on MPR40 6" pop-up body.	10		40			
25 50 100 ADJ	Toro 570S-FB-200-ADJ-PC200 Flood Bubbler on shrub riser	5		20			
SYMBOL	MANUFACTURER/MODEL/DESCRIPTION	QTY		PSI	GPM	RADIUS	
6	Hunter PGP-ADJ, 360 Turf Rotor, 4" popup, adjustable and full circle.	11		50	2.70	38'	
SYMBOL	MANUFACTURER/MODEL/DESCRIPTION	QTY					
	Irritrol 100P Electric Remote Control Valve, globe/angle configuration	7					
ICC	Hunter ICC Module Install in the existing Hunter ICC controller located within Palmetto Station	1					
P.O.C.	Existing 1 hp. submersible pump Existing well located on Palmetto Bus Station site	1					
	Irrigation Lateral Line: PVC Class 200 SDR 21 Only lateral transition pipe sizes 1" and above are indicated on the plan, with all others being 3/4" in size.	1,953 l.f.					
	Irrigation Mainline: PVC Schedule 40	305 l.f.					
	Pipe Sleeve: PVC Schedule 40 Typical pipe sleeve for irrigation pipe. Pipe sleeve size shall allow for irrigation piping and their related couplings to easily slide through sleeving material. Extend sleeves 18 inches beyond edges of paving or construction.	91 l.f.					

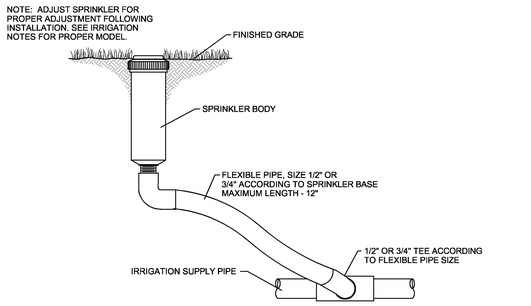
Valve Callout
#' Valve Number
Valve GPM
#" Valve Size



BUBBLER DETAIL
NOT TO SCALE



GEAR DRIVE SPRINKLERS, POP-UP DETAIL
N.T.S.



SPRAY HEAD SPRINKLERS, POP-UP DETAIL
NOT TO SCALE

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drawn: RCG/MF
checked: R.GAUSE
date: 10.08.2010
comm. no.: 1020805

IRRIGATION SPECIFICATIONS

L4

100%
Construction Documents