INVITATION FOR BID
IFB #14-1226-OV
Gulf Drive at Marina Drive, Intersection Improvements
Manatee County, FL
Project No.: 6084660
FDOT Financial Project ID: 431020-1-58-01

Manatee County, a political subdivision of the State of Florida, (hereinafter "County") will receive sealed Bids from individuals, corporations, partnerships, and other legal entities organized under the laws of the State of Florida or authorized to conduct business in the State of Florida.

NON-MANDATORY INFORMATION CONFERENCE
In order to ensure that all prospective Bidders have sufficient information and understanding of County's needs, an Information Conference will be held at: **11:00 AM on May 8, 2014** at the **Public Works Compound, 1022 26th Avenue East, Bradenton, FL 34208, Conference Room "B"**. Attendance is not mandatory, but is highly encouraged.

DEADLINE FOR CLARIFICATION REQUESTS: **5:00 PM on May 16, 2014**
(Reference Bid Article A.05)

TIME AND DATE DUE: **3:00 PM on June 11, 2014**

FOR INFORMATION CONTACT:
Olga Valcich, CPPB, Contract Specialist
(941) 749-3055, Fax (941) 749-3034
olga.valcich@mymanatee.org
Manatee County Financial Management Department
Purchasing Division

AUTHORIZED FOR RELEASE: DWW

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SECTION A

INFORMATION TO BIDDERS

A.01 OPENING LOCATION

Sealed Bids will be **publicly opened** at the **Manatee County Purchasing Division, 1112 Manatee Avenue West, Suite 803, Bradenton, Florida 34205** in the presence of County officials at the time and date stated, or soon thereafter. All Bidders or their representatives are invited to be present.

Any Bids received after the stated time and date will not be considered. It shall be the sole responsibility of the Bidder to have their Bid delivered to the Manatee County Purchasing Division for receipt on or before the stated time and date. Bidder shall be solely and strictly responsible for its timely delivery to the Purchasing Division. Bids delayed by mail, courier, or Bids delayed for any other reason, shall not be considered, shall not be opened at the public opening, and arrangements shall be made for their return at the Bidder's request and expense.

A.02 SEALED & MARKED

Bids shall be submitted in **triplicate, one original (marked Original) and two (2) copies (marked Copy)** of your **signed Bid** shall be submitted in one **sealed** package, clearly marked on the outside "**Sealed Bid #14-1226-OV, Gulf Drive at Marina Drive, Intersection Improvements, Manatee County, FL, Project No. 6084660, FDOT Financial Project ID: 431020-1-58-01**" along with your company name. For your convenience, a mailing label is provided with this Invitation for Bid package. Or, you may address the package as follows:

Address package to:

Manatee County Purchasing Division
1112 Manatee Avenue West, Suite 803
Bradenton, Florida 34205
Sealed Bid # _____, Title _____

All blank spaces must be filled in as noted with amounts extended and totaled and no changes shall be made in the wording of the forms or in the items mentioned therein. In the event a change is made in your submittal, the Bidder shall write its initials by the change. Any Bid may be rejected which contains any omissions, alterations, irregularities of any kind, or which shall in any manner fail to conform to Bid requirements.

A Bid made by an individual, either in his/her own or proper person or under a trade or firm name, shall be executed under the individual's signature. If made by a partnership, the Bid shall be executed by two or more of the general partners. If made by a corporation, the Bid shall be executed by its President or other legally authorized corporate officer or agent.

A.03 SECURING OF DOCUMENTS

Invitation for Bids (IFB) and related documents are available on http://www.mymanatee.org/purchasing for download in a portable document format (.PDF) file by clicking on "Bids and Proposals" from the Purchasing Division's web page. You may view and print these files using Adobe Reader software. If necessary, you may download a free copy of Adobe Reader from the link provided on the "Bids and Proposals" page.

Additionally, Manatee County collaborates with the Manatee Chamber of Commerce by emailing solicitation opportunities to its members.

Manatee County may also use DemandStar to distribute Bids. On the DemandStar web site, http://www.DemandStar.com, click on the tab titled "My DemandStar" for more information regarding this service. Participation in the DemandStar system is not a requirement for doing business with Manatee County.

Complete copies of the IFB and all related documents are available for public inspection at the Manatee County Purchasing Division, 1112 Manatee Avenue West, Suite 803, Bradenton, FL 34205, or by calling (941) 749-3014. Appointments are encouraged. Documents are available between the hours of 9:00 AM and 4:00 PM Monday through Friday, with the exception of holidays. A complete set of the IFB documents must be used in preparing Bids. County assumes no responsibility for errors and misinterpretations resulting from the use of incomplete sets of Bid Documents.

A.04 MODIFICATION OF IFB DOCUMENTS

If a Bidder wishes to recommend changes to the IFB documents, the Bidder shall furnish, in writing, data and information necessary to aid County in evaluating the request to modify the Specifications. County is not obligated to make any changes to the IFB documents. Unless an Addendum is issued, the IFB documents shall remain unaltered. **Bidders must fully comply with the IFB documents in their entirety.**

A.05 DEADLINE FOR CLARIFICATION REQUESTS

5:00 PM on May 16, 2014 shall be the deadline to submit all inquiries, suggestions, or requests concerning interpretation, clarification or additional information pertaining to this Invitation for Bid to the Manatee County Purchasing Division.

This deadline has been established to maintain fair treatment of all potential Bidders, while maintaining progression of the Project to promote economic stimulus.

A.06 CLARIFICATION & ADDENDA

Each Bidder shall examine all Invitation for Bid Documents and shall judge all matters relating to the adequacy and accuracy of such documents. Any inquiries, suggestions or requests concerning interpretation, clarification or additional information pertaining to this Invitation for Bid shall be made through the Manatee County Purchasing Division. County shall not be responsible for oral interpretations given by any County employee, representative, or others.

The issuance of a written Addendum is the only official method whereby interpretation, clarification or additional information can be given.

If any Addenda are issued to this Invitation for Bid, County will post the documents on the Purchasing Division's web page, which can be accessed at http://www.mymanatee.org/purchasing, and then by clicking on "Bids and Proposals". If the original solicitation was broadcast via DemandStar, the addenda will also be broadcast on the DemandStar distribution system to "Planholders" on this web service.

It shall be the **responsibility of each Bidder, prior to submitting their Bid**, to contact the Manatee County Purchasing Division (see contact information on the cover page) to **determine if any Addenda were issued** and to make such Addenda a part of their Bid.

A.07 LOBBYING

After the issuance of any Invitation for Bid prospective Bidders, or any agent, representative or person acting at the request of such Bidder shall not contact, communicate with or discuss any matter relating in any way to the Invitation for Bid with any officer, agent or employee of Manatee County other than the Purchasing Official or as directed in the Invitation for Bid, pursuant to the Manatee County Code. This prohibition includes the act of carbon copying officers, agents or employees of Manatee County on all correspondence, including email correspondence. This requirement begins with the issuance of an Invitation for Bid, and ends upon execution of Contract or when the invitation has been cancelled. Violators of this prohibition shall be subject to sanctions as provided in the Manatee County Code.

A.08 UNBALANCED BIDDING PROHIBITED

County recognizes that large and/or complex Projects will often result in a variety of methods, sources, and prices. However, where in the opinion of County such variation does not appear to be justified, given Bid requirements and industry and market conditions, the Bid will be presumed to be unbalanced. Examples of unbalanced Bids will include:

a. Bids showing omissions, alterations of form, additions not specified, or required conditional or unauthorized alternate Bids.

A.08 UNBALANCED BIDDING PROHIBITED (Continued)

b. Bids quoting prices that substantially deviate, either higher or lower, from those included in the Bids of competitive Bidders for the same line item unit costs.

c. Bids where the unit costs offered are in excess of or below reasonable cost analysis values.

In the event County determines that a Bid is presumed unbalanced, it will request the opportunity to, and reserves the right to, review all source quotes, Bids, price lists, letters of intent, etc., which the Bidder obtained and upon which the Bidder relied upon to develop its Bid. County reserves the right to reject as non-responsive any presumptive unbalanced Bids where the Bidder is unable to demonstrate the validity and/or necessity of the unbalanced unit costs.

A.09 FRONT END LOADING OF BID PRICING PROHIBITED

Prices offered for performance and/or acquisition activities to occur early in the Project schedule, such as mobilization; clearing and grubbing; or maintenance of traffic; that are substantially higher than pricing of competitive Bidders within the same portion of the Project schedule, will be presumed to be front end loaded. Front end loaded Bids could reasonably appear to be an attempt to obtain unjustified early payments creating a risk of insufficient incentive for the Bidder to complete the Work or otherwise creating an appearance of an undercapitalized Bidder.

In the event County determines that a Bid is presumed to be front end loaded, it will request the opportunity to, and reserves the right to, review all source quotes, bids, price lists, letters of intent, etc., which the Bidder obtained and upon which the Bidder relied upon to develop the pricing or acquisition timing for these Bid items. County reserves the right to reject as non-responsive any presumptive front end loaded Bids where the Bidder is unable to demonstrate the validity and/or necessity of the front end loaded costs.

A.10 WITHDRAWAL OF OFFERS

Bidders may withdraw offers as follows:

a. Mistakes discovered before the opening of a solicitation may be withdrawn by written notice from the Bidder submitting the Bid. This request must be received in the office designated for receipt of Bids in the solicitation document prior to the time set for delivery and opening of the Bids. A copy of the request shall be retained and the unopened Bid returned to that Bidder; or

b. After the responses to a solicitation are opened or a selection has been determined, but before a Contract is signed, a Bidder alleging a material mistake of fact may be permitted to withdraw their Bid if:

A.10 WITHDRAWAL OF OFFERS (Continued)

1. the mistake is clearly evident in the solicitation document; or

2. Bidder submits evidence which clearly and convincingly demonstrates that a mistake was made. Request to withdraw a Bid must be in writing and approved by the Purchasing Official.

A.11 IRREVOCABLE OFFER

Any Bid may be withdrawn up until the time and date set for opening of the Bid. Any Bid not so withdrawn shall, upon opening, constitute an irrevocable offer for a period of ninety (90) days to sell to Manatee County the goods or services set forth in the attached IFB until one or more of the Bids have been duly accepted by County.

A.12 BID EXPENSES

All expenses for making Bids to County are to be borne by the Bidder.

A.13 RESERVED RIGHTS

County reserves the right to accept or reject any and/or all Bids, to waive irregularities and technicalities, and to request resubmission. Also, County reserves the right to accept all or any part of the Bid and to increase or decrease quantities to meet additional or reduced requirements of County. Any sole response received by the first submission date may or may not be rejected by County depending on available competition and current needs of County. For all items combined, the Bid of the lowest, responsive, responsible Bidder will be accepted, unless all Bids are rejected.

The lowest, responsible Bidder shall mean that Bidder who makes the lowest Bid to sell goods and/or services of a quality which meets or exceeds the quality of goods and/or services set forth in the IFB documents or otherwise required by County, and who is fit and capable to perform the Bid as made.

To be responsive, a Bidder shall submit a Bid which conforms in all material respects to the requirements set forth in the Invitation for Bid.

To be a responsible Bidder, the Bidder shall have the capability in all respects to perform fully the Bid requirements, and the tenacity, perseverance, experience, integrity, reliability, capacity, facilities, equipment, and credit which will assure good faith performance.

Also, County reserves the right to make such investigation as it deems necessary to determine the ability of any Bidder to furnish the service requested. Information County deems necessary to make this determination shall be provided by the Bidder. Such information may include, but shall not be limited to current financial statements, verification of availability of equipment and personnel, and past performance records.

A.14 APPLICABLE LAWS

Bidder must be authorized to transact business in the State of Florida. All applicable laws and regulations of the State of Florida and ordinances and regulations of Manatee County will apply to any resulting Contract. Any involvement with the Manatee County Purchasing Division shall be in accordance with the Manatee County Purchasing Ordinance as amended.

A.15 COLLUSION

By submitting a Bid to this Invitation for Bid, the Bidder certifies that it has not divulged, discussed or compared its Bid with any other Bidder, and has not colluded with any other Bidder or parties to this Bid whatsoever. Also, Bidder certifies, and in the case of a joint Bid each party thereto certifies as to their own organization, that in connection with this Bid:

a. any prices and/or cost data submitted have been arrived at independently, without consultation, communication, or agreement, for the purpose of restricting competition, as to any matter relating to such prices and/or cost data, with any other Bidder or with any competitor;

b. any prices and/or cost data quoted for this Bid have not been knowingly disclosed by the Bidder and will not knowingly be disclosed by the Bidder, prior to the scheduled opening, directly or indirectly to any other Bidder or to any competitor;

c. no attempt has been made or will be made by the Bidder to induce any other person or firm to submit or not to submit a Bid for the purpose of restricting competition;

d. the only person or persons interested in this Bid, principal or principals is/are named therein and that no person other than therein mentioned has any interest in this Bid or in the resulting Contract to be entered into; and

e. no person or agency has been employed or retained to solicit or secure the resulting Contract upon an agreement or understanding or a commission, percentage, brokerage, or contingent fee except bona fide employees or established commercial agencies maintained by Bidder for purpose of doing business.

A.16 CODE OF ETHICS

With respect to this Bid, if any Bidder violates, directly or indirectly, the ethics provisions of the Manatee County Purchasing Ordinance and/or Florida criminal or civil laws related to public procurement, including but not limited to Florida Statutes, Chapter 112, Part III, Code of Ethics for Public Officers and Employees, such Bidder will be disqualified from eligibility to perform the Work described in this Invitation for Bid, and may also be disqualified from furnishing future goods or services to, and from submitting any future Bids to supply goods or services to, Manatee County.

A.16 CODE OF ETHICS (Continued)

By submitting a Bid, the Bidder represents to County that all statements made and materials submitted are truthful, with no relevant facts withheld. If a Bidder is determined to have been untruthful in their Bid or any related presentation, such Bidder will be disqualified from eligibility to perform the Work described in this Invitation for Bid, and may also be disqualified from furnishing future goods or services to, and from submitting any future Bids to supply goods or services to, Manatee County.

A.17 PUBLIC CONTRACTING AND ENVIRONMENTAL CRIMES

A person or affiliate who has been placed on the State's convicted vendor list following a conviction for a public entity crime, as that term is defined in Florida Statute § 287.133, may not submit a Bid to provide any goods or services to a public entity; may not submit a Bid with a public entity for the construction or repair of a public building or public work; may not submit Bids on leases of real property to a public entity; may not be awarded or perform Work as a Contractor, Supplier, Subcontractor, or Consultant under a Contract with any public entity; and may not transact business with any public entity in excess of the threshold amount provided in Florida Statutes § 287.017 for CATEGORY TWO for a period of thirty-six (36) months following the date of being placed on the convicted list.

In addition, the Manatee County Code prohibits the Award of any resulting Contract to any person or entity who/which has, within the past five (5) years, been convicted of, or admitted to in court or sworn to under oath, a public entity crime or of any environmental law that, in the reasonable opinion of the Purchasing Official, establishes reasonable grounds to believe the person or business entity will not conduct business in a responsible matter.

To ensure compliance with the foregoing, the Code requires all persons or entities desiring to contract with County to execute and file with the Purchasing Official an affidavit, executed under the pain and penalties of perjury, confirming that person, entity and any person(s) affiliated with the entity, does not have such a record and is therefore eligible to seek and be awarded business with County. In the case of a business entity other than a partnership or a corporation, such affidavit shall be executed by an authorized agent of the entity. In the case of a partnership, such affidavit shall be executed by the general partner(s). A Public Contracting and Environmental Crimes Certification form is included (reference Form B of this document) for this purpose.

A.18 BID FORMS

Bids must be submitted on attached provided forms, although additional pages may be attached. **Bidders must fully complete all pages of the Bid Forms. Bid Forms must be executed by an authorized signatory who has the legal authority to make the Bid and bind the company. Bidders must fully comply with all requirements of this IFB in its entirety.** Failure to comply shall result in default of the resulting Contract, whereupon, the defaulting Contractor shall be required to pay for any and all re-procurement costs, damages, and attorney fees as incurred by County.

A.19 LEGAL NAME

Bids shall clearly indicate the legal name, address and telephone number of the Bidder on the Bid Form. Bid Forms shall be signed above the typed or printed name and title of the signer. The signer must have the authority to bind the Bidder to the submitted Bid.

When Bidder is a partnership, the Bid Form shall be signed in the name of the firm and by all partners required under the terms of the partnership agreement. When a corporation is a Bidder, the authorized corporate officers shall sign.

Bidders who are corporations or limited partnerships shall provide a certified copy of their permit to transact business in the State of Florida, preferably along with the Bid Form, or within forty-eight (48) hours after request by County.

When submitting a Bid as a joint venture, it must have filed paper documents with the Division of Profession's Construction Industry Licensing Board prior to submitting a Bid.

A.20 DISCOUNTS

Any and all discounts must be incorporated in the prices contained in the Bid and not shown separately. The prices as shown on the Bid Form shall be the prices used in determining Award.

A.21 TAXES

Manatee County is exempt from Federal Excise and State Sales Taxes. (F.E.T. Cert. No. 59-78-0089K; Florida Sales Tax Exempt Cert. No. 85-8012622206C-6); therefore, the Bidder is prohibited from delineating a separate line item in his Bid for any sales or service taxes. Nothing herein shall affect the Bidder's normal tax liability.

A.22 DESCRIPTIVE INFORMATION

Unless otherwise specifically provided in the IFB documents, all equipment, materials and articles provided shall be new and of the most suitable grade for the purpose intended. Unless otherwise specifically provided in the IFB documents, reference to any equipment, material, article or patented process, by trade name, brand name, make or catalog number, shall be regarded as establishing a standard of quality and shall not be construed as limiting competition.

A.23 AMERICANS WITH DISABILITIES ACT

County does not discriminate upon the basis of any individual's disability status. This non-discrimination policy involves every aspect of County's functions including one's access to, participation, employment, or treatment in its programs or activities. Anyone requiring **reasonable accommodation** for an Information Conference or Bid Opening should contact the person named on the cover page of this Bid document at least twenty-four (24) hours in advance of either activity.

A.24 EQUAL EMPLOYMENT OPPORTUNITY CLAUSE

In accordance with the provisions of Title VI of the Civil Rights Act of 1964 and Title 15, Part 8 of the Code of Federal Regulations, County hereby notifies all prospective Bidders that they will affirmatively ensure minority business enterprises will be afforded full opportunity to participate in response to this advertisement and will not be discriminated against on the grounds of race, color or national origin in consideration for Bid Award.

A.25 MBE/DBE

The State of Florida, Office of Supplier Diversity provides the certification process and the database for identifying certified MBE/DBE firms. This service may be directly accessed at: http://www.osd.dms.state.fl.us/iframe.htm

If you have any questions regarding this State service, please contact their office at (850) 487-0915.

A.26 MATHEMATICAL ERRORS

In the event of multiplication/extension error(s), the unit price shall prevail. In the event of addition error(s) the extension totals will prevail. All Bids shall be reviewed mathematically and corrected, if necessary, using these standards, prior to additional evaluation.

A.27 DISCLOSURE

Upon receipt, all inquiries and responses to inquiries related to this Invitation for Bid become "Public Records", and shall be subject to public disclosure consistent with Florida Statues, Chapter 119.

Bids become subject to disclosure thirty (30) days after the opening or if a Notice of Intent to Award decision is made earlier than this time as provided by Florida Statutes § 119.071(1)(b). No announcement or review of the Bid shall be conducted at the public opening.

Based on the above, County will receive Bids at the time and date stated, and will make public at the opening the names of the business entities of all that submitted a Bid and any amount presented as a total offer without any verification of the mathematics or the completeness of the Bid.

A.27 DISCLOSURE (Continued)

If County rejects all Bids and concurrently notices its intent to reissue the solicitation, the rejected Bids are exempt from public disclosure until such time as County provides notice of an intended decision concerning the reissued solicitation or until County withdraws the reissued solicitation. A Bid is not exempt for longer than twelve (12) months after the initial notice rejecting all Bids.

Pursuant to Florida Statutes 119.0701, to the extent Successful Bidder is performing services on behalf of County, Successful Bidder must:

a. Keep and maintain public records that ordinarily and necessarily would be required by County in order to perform the service;

b. Provide the public with access to public records on the same terms and conditions that County would provide and at a cost that does not exceed the cost provided in Florida Statutes, Chapter 119, or as otherwise provided by law;

c. Ensure that public records that are exempt or confidential and exempt from public records disclosure requirements are not disclosed except as authorized by law, and;

d. Meet all requirements for retaining public records and transfer, at no cost, to County all public records in possession of Successful Bidder upon termination of the awarded Contract and/or PO and destroy any duplicate public records that are exempt or confidential from public records disclosure requirements. All records stored electronically must be provided to County in a format that is compatible with County's information technology systems.

A.28 VENDOR REGISTRATION

All vendors are encouraged to register with Manatee County using the on-line "Vendor Registration" web page on www.mymanatee.org/purchasing.

Your cooperation in registering your business with Manatee County will enhance our opportunities to identify sources for goods and services, plus identify local businesses. This information is used for soliciting quotations up to $250,000.00 and for competitive solicitations of larger purchases.

You will note that Manatee County collaborates with the Manatee Chamber of Commerce (www.manateechamber.com) by emailing solicitation opportunities to its members.

Our staff can assist you with your registration as needed. Our office hours are 8:00 A.M. to 5:00 P.M., Monday through Friday on regular business days. Please call (941) 749-3014 if you wish to have a Purchasing staff member assist you.

A.28 VENDOR REGISTRATION (Continued)

Quick steps to registration: **www.mymanatee.org/purchasing**

A link to Vendor Registration is listed on the Purchasing Division's web page under "Register as a Vendor".

Click on "Vendor Registration Form" for on-line input.

Thank you for reviewing this information and considering registering your business with Manatee County. Registration is not mandatory; however, by taking the time to register, you are helping County to provide timely notifications of Quotation, Bid and Proposal opportunities to your business.

A.29 ePAYABLES

Manatee County and Clerk of the Circuit Court have partnered to offer the ePayables program, which allows payments to be made to vendors via credit cards. The Clerk will issue a unique credit card number to each vendor; the card has a zero balance until payments have been authorized.

After goods are delivered or services rendered, vendors submit invoices to the remit to address on the purchase order according to the current process. When payments are authorized, an email notification is sent to the vendor. The email notification includes the invoice number(s), invoice date(s), and amount of payment. Once the vendor receives the email, the credit card has been authorized to be charged for the amount listed in the email. When the vendor charges the full amount authorized in the email, the card will return to a zero balance until the next payment is authorized.

There is no cost for vendors to participate in this program; however, there may be a charge by the company that processes your credit card transactions.

If you are interested in participating in this program, please complete Form D, ePayables Application and return the completed form via email to Ms. Lori Bryan, Supervisor at lori.bryan@manateeclerk.com.

NOTE: ANY OR ALL STATEMENTS CONTAINED IN THE FOLLOWING SECTIONS: MIMIMUM QUALIFICATIONS & BASIS OF AWARD, GENERAL TERMS AND CONDITIONS, OR SPECIFICATIONS, WHICH VARY FROM THE INFORMATION TO BIDDERS, SHALL HAVE PRECEDENCE.

END OF SECTION A

SECTION B

BID SUMMARY

B.01 THE WORK

The Work included in this Bid consists of the installation of Signalization, and Mast Arms on Gulf Drive at Marina Drive in Holmes Beach, Bradenton, FL.

Project shall be constructed in accordance with the governing standards and specifications of the Florida Department of Transportation, 2014 Design Standards and revised index drawings as appended herein, and 2014 standard specifications for road and bridge construction, as amended by Contract documents.

For Design Standards click on the "Design Standards" link at the following website: HTTP://www.dot.state.fl.us/rddesign/

For the Standard Specifications for Road and Bridge construction click on the "Specifications" link at the following website: HTTP://www.dot.state.fl.us/specificationsoffice/

All required MOT shall be provided by the Contractor and approved by Manatee County.

The Successful Bidder shall furnish all Shop Drawings, working drawings, labor, materials, equipment, tools, services and incidentals necessary to complete all Work required by these Specifications.

The successful Bidder shall perform the Work complete, in place and ready for continuous service and shall include any repairs, replacements, and/or restoration required as a result of damages caused prior to acceptance by County.

The Successful Bidder shall furnish and install all materials, equipment and labor which is reasonably and properly inferable and necessary for the proper completion of the Work, whether specifically indicated in the Bid Documents or not.

B.02 EXAMINATION OF BID DOCUMENTS AND SITE(S)

It is the responsibility of each Bidder before submitting a Bid, to (a) examine the Bid Documents thoroughly; (b) visit the site(s) to become familiar with local conditions that may affect cost, progress, performance, or furnishing of the Work; (c) consider federal, state, and local codes, laws, and regulations that may affect costs, progress, performance, or furnishing of the Work; (d) study and carefully correlate Bidder's observations with the Bid Documents; and (e) notify County of all conflicts, errors, or discrepancies in the Bid Documents.

Each Bidder may, at Bidder's own expense, make or obtain any additional examinations, investigations, explorations, tests and studies, and obtain any additional information and data which pertain to the physical conditions at or contiguous to the site(s) or otherwise which may affect cost, progress, performance or furnishing of the Work and which Bidder deems necessary to determine his Bid for performing and furnishing the Work in accordance with the time, price and other terms and conditions of the Bid Documents.

B.02 EXAMINATION OF BID DOCUMENTS AND SITE(s) (Continued)
County will provide each Bidder access to the site(s) to conduct such explorations and tests.

Bidder shall fill all holes, clean up and restore the site(s) to its former condition upon completion of such explorations. The lands upon which the Work is to be performed, rights-of-way and easements for access thereto, and other lands designated for use by Contractor in performing the Work are identified in the Bid Documents.

All additional lands and access thereto required for temporary construction facilities or storage of materials and equipment are to be provided by Contractor. Easements for permanent structures or permanent changes in existing structures are to be obtained and paid for by County unless otherwise provided in the Bid Documents.

Inspection of the site(s) is **a requirement** to be considered for Award of this Bid. Prior to submitting a Bid, each Bidder shall examine the site(s) and all conditions thereon fully familiarizing themselves with the full scope of the Project. Failure to become familiar with site conditions will in no way relieve the Successful Bidder from the necessity of furnishing any materials or performing any Work that is required to complete the Project in accordance with the plans and Specifications. Bidder shall acknowledge inspection of the Project site(s) on his/her signed, submitted Bid Form.

END OF SECTION B

SECTION C

BASIS OF AWARD & MINIMUM QUALIFICATIONS

C.01 BASIS OF AWARD

Award shall be to the lowest, responsive, responsible Bidder meeting Specifications and having the lowest total offer for the requirements listed on the Bid Form for the Work as set forth in this Invitation for Bid. Bid prices shall include costs for furnishing all labor, equipment and/or materials for the completion of the Work in accordance with and in the manner set forth and described in the Bid Documents to County's satisfaction within the prescribed time.

NOTE: Inspection of the site is a pre-requisite to be considered for Award of this Bid.

In evaluating Bids, County shall consider the qualifications of the Bidders; and if required, may also consider the qualifications of the Subcontractors, Suppliers, and other persons and organizations proposed. County may also consider the operating costs, maintenance requirements, performance data and guarantees of major items of materials and equipment proposed for incorporation in the Work.

Whenever two or more Bids are equal with respect to price, the Bid received from a local business shall be given preference in Award. Whenever two or more Bids which are equal with respect to price are received, and neither of these Bids are from a local business, the Award shall be determined by a chance drawing, coin toss, or similar tie-breaking method conducted by the Purchasing Division and open to the public.

C.02 MINIMUM QUALIFICATIONS OF BIDDERS

No person who is not certified or registered as a General Contractor or State FDOT Pre-Qualified Contractor in the category of "Traffic Signal" pursuant to Florida Statutes, Chapter 489 on the day the Bid is submitted, and who has continuously held that certification or registration for a period of at least three (3) consecutive years immediately prior to the day the Bid is submitted, may be qualified to bid on this Project. In the event that a Bidder is a business organization, including a partnership, corporation, business trust or other legal entity as set forth in Florida Statutes § 489.119(2), then the Bidder shall only be qualified to bid on this Project if: 1) the Bidder (the business organization) is on the day the Bid is submitted, and for at least three (3) consecutive years immediately prior to the day the Bid is submitted has been, in continuous existence, properly licensed and registered as required by Florida law; and 2) the Bidder, on the day the Bid is submitted, has a certified or registered Qualifying Agent, as required by Florida Statutes § 489.119, and that Qualifying Agent has been the same Qualifying Agent of the Bidder for a period of at least three (3) consecutive years immediately prior to the day the Bid is submitted.

END OF SECTION C

SECTION D

GENERAL TERMS & CONDITIONS

D.01 CONTRACT FORMS

The Contract resulting from the acceptance of a Bid shall be in the form of the Contract stated in this Bid (reference Section F of this document).

A written notice confirming Award or recommendation thereof will be forwarded to the Successful Bidder accompanied by the required number of unsigned counterparts of the Contract. Within ten (10) days thereafter, Successful Bidder shall sign and deliver the required number of counterparts of the Contract with any other required documents to County. (Note: Contract must be approved in accordance with Chapter 2-26 of the Manatee County Code, and the Administrative Standards and Procedures Manual approved by the County Administrator).

D.02 ASSIGNMENT OF CONTRACT

Contractor shall not assign, transfer, convey, sublet or otherwise dispose of the resulting Contract or of his right, title, or interest therein, or his power to execute such Contract, or to assign any monies due or to become due there under to any other person, firm or corporation unless first obtaining the written consent of County. The giving of such consent to a particular Subcontractor assignment shall not dispense with the necessity of such consent to any further or other assignment.

D.03 COMPLETION OF WORK

The Work will be completed and ready for final inspection within the specified calendar days from the date the Contract Time commences to run. Bid shall be based on **180 calendar days**. County has the sole authority to select the Bid based on the completion time which is in the best interest of County.

D.04 LIQUIDATED DAMAGES

If the Contractor refuses or fails to prosecute the Work, or any separable part thereof, with such diligence as will hinder its completion within the time specified, County may seek damages. The actual damages for delay will be impossible to determine and in lieu thereof, the Contractor shall pay to County the sum of **$758.00** as fixed, agreed, and liquidated damages for each calendar day of the delay until the Work is finally accepted by County and the Contractor and his Surety shall be liable for the amount thereof.

D.05 PAYMENT

Contractor may apply for partial payment on monthly estimates, based on the amount of the Work done or completed in compliance with the provisions of the resulting Contract. Contractor shall submit an application, on a standard pay application form provided or approved by County, of an approximate estimate of the proportionate value of the Work done, items and locations of the Work performed up to and including the last day of the period then ending.

D.05 PAYMENT (Continued)

County will then review said estimate and make any necessary revisions so that the estimate can receive approval for payment. If the Contractor and County do not agree on the approximate estimate of the proportionate value of the Work done for any pay period, the determination of County will be binding. The amount of said estimate after deducting any required Retainage and all previous payments shall be due and payable to the Contractor, twenty (20) business days if County is its own Engineer of Record (EOR) or twenty-five (25) business days if outside agent approval is required after the pay estimate has been approved by the agent for County.

In accordance with the Prompt Payment Act, Florida Statutes § 218.735(7), a Punch List shall be formulated.

Time allowed for development of Punch List:

a. Awarded Contracts with an estimated cost of less than $10 million will be within thirty (30) calendar days after reaching Substantial Completion.

b. Awarded Contracts with a cost of $10 million dollars or more will be within thirty (30) calendar days OR if extended by Contract, up to sixty (60) calendar days after reaching Substantial Completion.

The Final Completion date of the resulting Contract must be at least thirty (30) days after delivery of the list of items. If the list is not provided to the awarded Contractor by the agreed upon date, the Contract completion time must be extended by the number of days County exceeds the delivery date.

It is the Contractor's responsibility for the care of the materials. Any damage to or loss of said materials is the full responsibility of the Contractor. Any periodical pay estimate signed by the Contractor shall be final as to the Contractor for any or all Work covered by the periodical pay estimate.

Any requests for payment of materials stored on site must be accompanied with a paid receipt. The Contractor warrants and guarantees that title to all Work, materials and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to County at the time of payment free and clear of all liens, claims, security interests and encumbrances (hereafter referred to as "Liens").

The Contractor agrees to furnish an affidavit stating that all laborers, material men, and Subcontractors have been paid on the Project for Work covered by the Application for Payment and that a partial or complete release of lien, as may be necessary, be properly executed by the material men, laborers, Subcontractors on the Project for Work covered by the Application for Payment, sufficient to secure County from any claim whatsoever arising out of the aforesaid Work. When the Contractor has completed the Work in compliance with the terms of the Contract Documents, he shall notify County in writing that the Project is ready for final inspection.

D.05 PAYMENT (Continued)

County will then advise the Contractor as to the arrangements for final inspection and what Work, if any, is required to prepare the Project or a portion thereof for final inspection. When County determines the Project or portion thereof is ready for final inspection, County shall perform same. Upon completion of final inspection, County will notify Contractor of all particulars in which this inspection reveals that the Work is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies. When all such errors have been corrected, a final re-inspection will be made.

The process will be repeated until, in the opinion of County, the Project has been completed in compliance with the terms of the Contract Documents.

When final acceptance has been made by County, County will make final payment of the resulting Contract amount, plus all approved additions, less approved deductions and previous payments made. The resulting Contract will be considered complete when all Work has been finished, the final inspection made, approved as-builts received, and the Project finally accepted in writing by County. The Contractor's responsibility shall then terminate except as otherwise stated.

D.06 CONTRACT CONTINGENCY WORK

This Bid item entails a monetary allowance which is used at County's discretion to handle unexpected conditions as required to satisfactorily complete the Project in accordance with the plans and Specifications. A Field Directive must be issued by an authorized County Representative to authorize use of Contract Contingency funds.

The percentage for Contract Contingency is listed on the Bid Form. Vendor shall enter the amount for Contract Contingency based on the percentage of their Total Base Bid. The total Contract Award will include the Contract Contingency funds.

Appropriate uses of Contract Contingency funds include increases to existing Bid item quantities that do not change the initial Scope of Work, which may be directed by staff; modification items not originally bid which were unforeseen yet necessary during the construction to provide a safe, complete Project and that do not change the initial Scope of Work; and unanticipated conflicts and/or design changes required during construction which are necessary to provide a safe, complete Project and that do not change the initial Scope of Work.

Inappropriate uses of Contract Contingency funds include anything that changes the initial Scope of Work, including the Contract Price and Contract Time, and adding Bid items not previously contemplated that change the initial Scope of Work.

D.07 RETAINAGE

A Retainage of 10% of the total Work in place shall be withheld until 50% complete. After 50% completion, the Retainage shall be reduced to 5% of the total Work in place until Final Completion and acceptance of the Work by County. Upon final acceptance, the remaining Retainage shall be included in the final payment.

D.08 PROGRESS REQUIREMENTS

All Work done under the resulting Contract shall be done with a minimum of inconvenience to the private property owners in the area. The Contractor shall coordinate his Work with private property owners such that existing utility services are maintained and they have access to their property at all times.

D.09 MATERIALS AND WORKMANSHIP

All materials and apparatus required for this Work, except as specified otherwise, shall be new, of first class quality, and shall be furnished, delivered, connected and finished in every detail. Construction shall be prescribed by good industry practice and in accordance with manufacturer's recommendations for the type being installed.

Use skilled workman trained and experienced in the necessary trades and who are completely familiar with the specified requirements and the methods needed for proper performance of the Work of this section.

D.10 PROJECT CLOSE-OUT

Clean construction site and remove any and all excess materials. Correct any damages to property that may have occurred as a result of installation and/or delivery. Repair and patch all surfaces cut for installation. The Contractor shall remedy any deficiencies promptly should County determine any Work is incomplete or defective.

When County determines the Work is acceptable in accordance with this Invitation for Bid, the Contractor shall provide the close out submittals, including but not necessarily limited to the following:

1 set	Certificate of Warranties	
1 set	Manufacturer's Product Literature	(when applicable)
1 set	Project Record Drawings	
1 set	Subcontractor Information	(when applicable)

D.11 ROYALTIES AND PATENTS

The Contractor shall pay all royalties and license fees for equipment or processes in conjunction with the equipment and/or services being furnished. Contractor shall defend all suits or claims for infringement of any patent, trademark or copyright, and shall save County harmless from loss on account thereof, including costs and attorney's fees.

D.12 AUTHORIZED PRODUCT REPRESENTATION

The Bidder, by virtue of submitting the name and Specifications of a manufacturer's product, will be required to furnish the named manufacturer's product. Failure to perform accordingly may, in County's sole discretion, be deemed a Material Breach of the resulting Contract, and shall constitute grounds for County's immediate termination of the resulting Contract.

D.13 REGULATIONS

It shall be the responsibility of the Contractor to assure compliance with any OSHA, EPA and/or other federal or State of Florida rules, regulations or other requirements, as each may apply.

D.14 CANCELLATION

Any failure of the Contractor to furnish or perform the Work (including, but not limited to, commencement of the Work, failure to supply sufficient skilled workers or suitable materials or equipment) in accordance with the resulting Contract, County may order the stop of the Work, or any portion thereof, until the cause for such order has been eliminated. If the Contractor persistently fails to perform the Work in accordance with the resulting Contract, County reserves the right to terminate the resulting Contract and select the next qualified Bidder or re-advertise this procurement in part or in whole. County reserves the right to cancel all or any undelivered or unexecuted portion of the resulting Contract with or without cause.

D.15 INDEMNIFICATION

The Contractor covenants and agrees to indemnify and save harmless County, its agents and employees, from and against all claims, suits, actions, damages, causes of action, or judgments arising out of the terms of the resulting Contract for any personal injury, loss of life, or damage to the property sustained as a result of the performance or non-performance of services or delivery of goods; from and against any orders, judgments, or decrees, which may be entered against County, its agents or employees; and from and against all costs, attorney's fees, expenses and other liabilities incurred in the defense of any such claim, suit or action, and the investigation thereof. Nothing in the resulting Award, Contract or Purchase Order shall be deemed to affect the rights, privileges and immunities of County as set forth in Florida Statutes § 768.28.

D.16 SUBCONTRACTORS, SUPPLIERS AND OTHERS

The identity of Subcontractors, Suppliers, and other persons and organizations (including those who are to furnish the principal items of material and equipment) may be requested by County for each Bid item from any of the Bidders; and the Bidder shall respond within five (5) days after the date of such request. Such list shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor, Supplier, persons or organization if requested by County. If County, after due investigation, has reasonable objection to any proposed Subcontractor, Supplier, other person or organization, County may, before the Notice of Intent to Award is given, request the apparent Successful Bidder to submit an acceptable substitute without an increase in Contract Price or Contract Time.

If apparent Successful Bidder declines to make any such substitution, County may Award the resulting Contract to the next lowest qualified Bidder that proposes to use acceptable Subcontractors, Suppliers, and other persons who County does not make written objection to. Contractor shall not be required to employ any Subcontractor, Supplier, other person or organization who Contractor has reasonable objection to.

D.16 SUBCONTRACTORS, SUPPLIERS AND OTHERS (Continued)

Subcontractors shall be bound by the terms and conditions of the resulting Contract insofar as it applies to their work, but this shall not relieve the prime Contractor from the full responsibility to County for the proper completion of all Work to be executed under the resulting Contract.

The employment of unauthorized aliens by any Contractor is considered a violation of Section 274 (e) of the Immigration and Employment Act. If the Contractor knowingly employs unauthorized aliens, such violation shall be cause for unilateral cancellation of the resulting Contract.

A complete list of all Subcontractors proposed for any portion of the Work may be requested of any Bidder deemed necessary by County. Subcontracts shall be awarded only to those Subcontractors considered satisfactory by County.

D.17 MANUALS, SCHEMATICS, HANDBOOKS (IF APPLICABLE)

All manuals, schematics and handbooks shall be provided which are applicable to the equipment delivered. An operators manual, parts manual and technician manual must also be provided. Parts lists (manuals) must include OEM part numbers for items not manufactured by the Contractor. Contractor shall furnish two (2) copies of each.

D.18 INSURANCE

The Contractor will not commence Work under the resulting Contract until all insurance under this section and such insurance coverage as might be required by County has been obtained. The Contractor shall obtain, and submit to the Purchasing Division within ten (10) calendar days from the date of Notice of Intent to Award, at his expense, the following minimum amounts of insurance (inclusive of any amounts provided by an umbrella or excess policy):

a. Workers' Compensation/Employers' Liability

Part One - There shall be no maximum limit (other than as limited by the applicable statute) for liability imposed by Florida Workers' Compensation Act or any other coverage required by the resulting Contract Documents which are customarily insured under Part One of the standard Workers' Compensation Policy.

Part Two - The minimum amount of coverage required by the resulting Contract Documents which are customarily insured under Part Two of the standard Workers' Compensation Policy shall be:

(Each Accident)	$100,000
(Disease-Policy Limit)	$500,000
(Disease-Each Employee)	$100,000

D.18 INSURANCE (Continued)

b. Commercial General Liability

The limits are to be applicable only to Work performed under the resulting Contract and shall be those that would be provided with the attachment of the Amendment of Limits of Insurance (Designated Project or Premises) endorsement (ISO Form CG 25 03) a Commercial General Liability Policy with the following minimum limits.

General Aggregate:	
Products/Completed Operations Aggregate	$2,000,000
Personal and Advertising Injury	$1,000,000
Each Occurrence	$1,000,000
Fire Damage (Any One Fire)	$Nil
Medical Expense (Any One Person)	$Nil

ADDITIONAL INSURED: Manatee County, a political subdivision of the State of Florida, shall be specifically named as additional insured on the Commercial General Liability Policy.

c. Business Auto Policy

Each Occurrence Bodily Injury and	
Property Damage Liability Combined	$300,000
Annual Aggregate (if applicable)	$1,000,000

ADDITIONAL INSURED: Manatee County, a political subdivision of the State of Florida, shall be specifically named as additional insured on the Business Auto Policy.

d. Property Insurance

If the resulting Contract includes construction of or additions to above ground buildings or structures, Contractor shall provide "**Builder's Risk**" insurance with the minimum amount of insurance to be 100% of the value of such addition(s), building(s), or structure(s).

e. Installation Floater

If the resulting Contract does not include construction of or additions to above ground building or structures, **but does involve** the installation of machinery or equipment, Contractor shall provide an "**Installation Floater**" with the minimum amount of insurance to be 100% of the value of such addition(s), building(s), or structure(s).

f. Certificates of Insurance and Copies of Policies

Certificates of Insurance in triplicate evidencing the insurance coverage specified herein shall be filed with the Purchasing Official before operations are begun. The required certificates of insurance shall name the types of policy, policy number, date of expiration, amount of coverage, companies affording coverage, and also shall refer specifically to the Bid number and title of the Project. All insurance policies required herein shall be issued by companies that are authorized to do business under the laws of the State of Florida and hold an A.M.

D.18 INSURANCE (Continued)

Best rating of A- or better. Insurance, as specified herein, shall remain in force and effect for the duration of the Project including any warranty periods.

g. Complete Policies: The entire and complete insurance policies required herein shall be provided to County on request.

Nothing herein shall in any manner create any liability of County in connection with any claim against the Contractor for labor, services, or materials, or of Subcontractors; and nothing herein shall limit the liability of the Contractor or Contractor's Sureties to County or to any Workers, Suppliers, material men or employees in relation to the resulting Contract.

h. By way of its submission of a Bid hereto, Bidder:

1. Represents that Bidder maintains, and will maintain during the term of any Contract arising from this solicitation, insurance coverage from responsible companies duly authorized to do business in the State of Florida and deemed acceptable to County, as set forth in this solicitation; and

2. Agrees that, insurance should not be cancelled without thirty (30) days notice to County and must be endorsed to provide same. Failure of Bidder to obtain and maintain proper amounts of insurance at all times as called for herein shall constitute a Material Breach of the resulting Contract, which may result in immediate termination.

i. Certification Requirements – In order for the certificate of insurance to be accepted it **must** comply with the following:

1. The certificate holder shall be:
Manatee County Board of Commissioners,
A political subdivision of the State of Florida
P.O. Box 1000
Bradenton, FL 34206-1000
IFB# 14-1226-OV, Gulf Drive at Marina Drive, Intersection Improvements
Manatee County, FL, Project No.:6084660, FDOT Financial Project ID: 431020-1-58-01

2. Certificate shall be mailed to:
Manatee County Purchasing Division
1112 Manatee Avenue West, Suite 803
Bradenton, FL 34205
Attn: Olga Valcich, CPPB, Contract Specialist

D.19 BID BOND/CERTIFIED CHECK

By submitting a Bid to this Invitation for Bid, the Bidder agrees should the Bidder's Bid be accepted, **to execute the form of Contract and present the same to Manatee County for approval within ten (10) calendar days after Notice of Intent to Award**. The Bidder further agrees that failure to execute and deliver said form of Contract **within ten (10) calendar days** will result in damages to Manatee County and as guarantee of payment of same a Bid Bond/certified check shall be enclosed within the submitted sealed Bid in the amount of five (5%) percent of the total amount of the Bid. The Bidder further agrees that in case the Bidder fails to enter into a Contract, as prescribed by Manatee County, the Bid Bond/certified check accompanying the Bid shall be forfeited to Manatee County as agreed liquidated damages. If County enters into a Contract with a Bidder, or if County rejects any and/or all Bids, accompanying bond will be promptly returned.

D.20 PERFORMANCE AND PAYMENT BONDS

The Successful Bidder shall furnish Surety bonds using the Public Construction Bond form prescribed in Florida Statutes § 255.05, which is provided herein, as security for faithful performance of the Contract awarded as a result of this Bid and for the payment of all persons performing labor and/or furnishing material in connection therewith. Failure to provide the required bonds on the prescribed form may result in Successful Bidder being deemed nonresponsive. Bonds must be in the form prescribed in Florida Statutes § 255.05, and must not contain notice, demand or other terms and conditions, including informal pre-claim meetings, not provided for in Florida Statutes § 255.05.

Surety of such bonds shall be in an amount equal to 100% of the Contract Award issued by a duly authorized and nationally recognized Surety company, authorized to do business in the State of Florida, satisfactory to this County. Surety shall be rated as "A-" or better as to general policy holders rating and Class V or higher rating as to financial size category and the amount required shall not exceed 5% of the reported policy holders' surplus, all as reported in the most current Best Key Rating Guide, published by A.M. Best Company, Inc. of 75 Fulton Street, New York, New York, 10038. The attorney-in-fact who signs the bonds must file with the bonds, a certificate and effective dated copy of power-of-attorney. Performance and Payment Bonds shall be issued to Manatee County, a political subdivision of the State of Florida, within ten (10) calendar days after Notice of Intent to Award.

In addition, pursuant to Florida Statutes § 255.05(1)(b), prior to commencing Work, the Contractor shall be responsible and bear all costs associated to record the Performance and Payment Bond with the Manatee County Clerk of the Circuit Court. A certified copy of said recording shall be furnished to the Purchasing Division upon filing. Pursuant to Florida Statutes § 255.05(1)(b), County will make no payment to the Contractor until the Contractor has complied with this paragraph.

D.20 PERFORMANCE AND PAYMENT BONDS (Continued)

Furnishing Performance and Payment Bonds shall be requisite to execution of a Contract with County. Said Performance and Payment Bonds will remain in force for the duration of the Contract with the premiums paid by the Contractor. Failure of the Successful Bidder to execute such Contract and to supply the required bonds shall be just cause for cancellation of the Award. County may then contract with another acceptable Bidder or re-advertise this Invitation for Bid. If another Bidder is accepted, and notice given within ninety (90) days after the opening of the Bids, this acceptance shall bind the Bidder as though they were originally the Successful Bidder.

Failure of County at any time to require performance by the Contractor of any provisions set out in the resulting Contract will in no way affect the right of County, thereafter, to enforce those provisions.

When activity occurs within the resulting Contract that increases the amount of the Contract by either an approved Administrative Contract Adjustment (ACA) or an approved Change Order, a recorded Bond Rider shall be provided before the additional Work can proceed. All premiums shall be paid by the Contractor.

D.21 NO DAMAGES FOR DELAY

No claim for damages or any claim other than for an extension of time shall be made or asserted against County by reason of any delays. The Contractor shall not be entitled to an increase in the total Contract Price or payment or compensation of any kind from County or direct, indirect, consequential impact or other costs, expenses for damages, including but not limited to costs of acceleration or inefficiency arising because of delay, disruption, interference or hindrance from any cause whatsoever; provided, however, that this provision shall not preclude recovery or damages by the Contractor for hindrance or delays due solely to fraud, bad faith, or active interference on part of County or its agents. Otherwise, the Contractor shall only be entitled to extensions of the Contract Time as the sole and exclusive remedy for such resulting delay, in accordance with and to the extent specifically provided above.

D.22 NO INTEREST

Any monies not paid by County when claimed to be due to the Contractor under this Contract shall not be subject to interest including prejudgment interest. Any monies not paid by County when claimed to be due to the Contractor for damages awarded in the case of construction delays shall not be subject to prejudgment interest.

D.23 CONSTRUCTION OF CONTRACT

The resulting Contract and the rights and responsibilities hereunder shall not be construed more strongly against either party, regardless of the extent to which such party may have participated in the preparation hereof.

D.24 BE GREEN

All Contractors are encouraged to use as many **environmentally preferable** "green" products, materials, supplies, etc. as possible in order to promote a safe and healthy environment. **Environmentally preferable are products or services that have a reduced adverse effect on the environment.** Provide detail of your organization's initiative and its ability to meet the goal of environmental sustainability.

END OF SECTION D

BID FORM

(Submit in triplicate)

For: IFB#14-1226-OV, Gulf Drive at Marina Drive, Intersection Improvements, Manatee County, FL, Project No.: 6084660, FDOT Financial Project ID: 431020-1-58-01

Total Offer: _____
Based on a completion time of 180 calendar days

We, the undersigned, hereby declare that we have carefully reviewed the Bid Documents and with full knowledge and understanding of the aforementioned herewith submit this Bid, meeting each and every specification, term, and condition contained in the Invitation for Bid package, in its entirety.

We understand that the Invitation for Bid package, in its entirety, including but not limited to, all Specifications, terms, and conditions shall be made a part of any resulting Contract between Manatee County and the Successful Bidder. Failure to comply shall result in Contract default, whereupon, the defaulting Contractor shall be required to pay for any and all re-procurement costs, damages, and attorney fees as incurred by County, and agrees to forfeit his/her Bid Bond.

Communications concerning this Bid shall be addressed as follows: **(Complete all fields)**

Bidder's Name: _____

Mailing Address: _____

Telephone: (___) _____ Fax: (___) _____

Email Address: _____

I, _____ **on** [date(s)] _____ **attest that I have visited the Project site(s) to familiarize myself with the full Scope of Work required for the Bid.**

Acknowledge Addendum No.____ Dated: _____ Acknowledge Addendum No.____ Dated: _____
Acknowledge Addendum No.____ Dated: _____ Acknowledge Addendum No.____ Dated: _____
Acknowledge Addendum No.____ Dated: _____ Acknowledge Addendum No.____ Dated: _____

Authorized Signature(s): _____

Name and Title of Above Signer(s): _____

Date: _____

BID FORM

(Submit in Triplicate) Section 00300 Bid "A"

Gulf Drive at Marina Drive Intersection Improvements, Manatee County, FL

LAP Agreement #431020-1-58-01 / Project No.: 6084660

IFB #14-1226-OV

BID Based on Completion Time of 180 Calendar Days

ITEM #	FDOT ITEM	DESCRIPTION	QTY	U/M	BID PRICE PER UNIT	TOTAL BID PRICE
1	101-1	MOBILIZATION	LS	1	$	$
2	102-1	MAINTENANCE OF TRAFFIC	LS	1	$	$
3	102-14	TRAFFIC CONTROL OFFICER	24	ED	$	$
4	102-60	WORK ZONE SIGN	1440	ED	$	$
5	102-76	ARROW BOARD/ADVANCE WARNING ARROW PANEL	8	ED	$	$
6	102-104	TEMPORARY SIGNALIZATION & MAINTENANCE INTERSECTION	180	ED	$	$
7	102-107-1	TEMPORARY TRAFFIC DETECTION & MAINTENANCE INTERSECTION	180	ED	$	$
8	519-78	BOLLARDS	2	EA	$	$
9	520-2-4	CONCRETE CURB (TYPE D)	35	LF	$	$
10	522-1	CONCRETE SIDEWALK (4" THICK)	11	SY	$	$
11	580-1-2	LANDSCAPE COMPLETE - LARGE PLANTS	1	LS	$	$
12	630-2-11	CONDUIT (F & I) (OPEN TRENCH)	30	LF	$	$
13	630-2-12	CONDUIT (F & I) DIRECTIONAL BORE)	120	LF	$	$
14	632-7-1	SIGNAL CABLE (F & I) (NEW OR RECONSTRUCTED INT)	1	PI	$	$
15	635-2-11	PULL & SPLICE BOX (F & I) 17" X 30" COVER SIZE	6	EA	$	$

Bidder:_____

Gulf Dr at Marina Dr Inter. Improv.

Authorized Signature:_____

BID FORM

(Submit in Triplicate) Section 00300 Bid "A"

Gulf Drive at Marina Drive Intersection Improvements, Manatee County, FL

LAP Agreement #431020-1-58-01 / Project No.: 6084660

IFB #14-1226-OV

BID Based on Completion Time of 180 Calendar Days

ITEM #	FDOT ITEM	DESCRIPTION	QTY	U/M	BID PRICE PER UNIT	TOTAL BID PRICE
16	632-9-1-112	(METERBASE PURCH BY CONTRACTOR)	1	AS	$	$
17	639-2-1	ELECTRICAL SERVICE WIRE (F & I)	60	LF	$	$
18	641-1	STRAIN POLES GUYING (CONCRETE)	1	EA	$	$
19	641-2-12	CONCRETE POLE (F & I) (TYPE P-11, SERVICE POLE, 36")	1	EA	$	$
20	649-31-104	MAST ARM (F & I) (150 MPH) (70.5 FOOT ARM)	1	EA	$	$
21	650-1-311	TRAFFIC SIGNAL 12" (F & I) (ALUM) (3 SECT., 1-WAY) LED	6	AS	$	$
22	660-4-11	VEHICLE DETECTION SYSTEM (F & I) (VIDEO) (CABINET EQUIPMENT)	1	EA	$	$
23	660-4-12	VEHICLE DETECTION SYSTEM (F & I) (VIDEO) (ABOVE GROUND EQUIPMENT)	3	EA	$	$
24	668-35	DET CABINET (INST) (TYPE V) (54" x 38" x 24")	1	EA	$	$
25	670-5-410	TRAFFIC CONTROLLER ASSEMBLY (MODIFY) (NEMA)	1	AS	$	$
26	690-10	TRAFFIC SIGNAL HEAD ASSEMBLY (REMOVE)	6	EA	$	$
27	690-32-1	POLE REMOVAL (SHALLOW (DIRECT BURIAL)	2	EA	$	$
28	690-34-1	POLE REMOVAL (DEEP) DIRECT BURIAL) (BID ALTERNATE)	2	EA	$	$
29	690-80	VEHICLE DETECTOR ASSEMBLY (REMOVAL)	5	EA	$	$
30	690-80	SPAN WIRE ASSEMBLY (REMOVAL)	1	EA	$	$

Bidder:_____

Authorized Signature:_____

BID FORM

(Submit in Triplicate) Section 00300 Bid "A"

Gulf Drive at Marina Drive Intersection Improvements, Manatee County, FL

LAP Agreement #431020-1-58-01 / Project No.: 6084660

IFB #14-1226-OV

BID Based on Completion Time of 180 Calendar Days

ITEM #	FDOT ITEM	DESCRIPTION	QTY	U/M	BID PRICE PER UNIT	TOTAL BID PRICE
31	690-90	CONDUIT & CABLING WITHIN INTERSECTION (REMOVE)	1	PI	$	$
32	690-100	SIGNAL EQUIPMENT (MISCELLANEOUS (REMOVE)	1	PI	$	$
33	700-5-22	INTERNALLY ILLUMINATED SIGN (F & I) (12 - 18 SF)	2	EA	$	$
34	700-46-15	SIGN EXISTING REMOVE (SPAN WIRE)	3	AS	$	$
		TOTAL BID Based on Completion Time of 180 Calendar Days				$
35		**CONTRACT CONTINGENCY WORK (Used only with County Approval)**			**10% OF TOTAL BASE BID**	$
TOTAL AWARD AMOUNT FOR BID With Contract Contingency - Based on Completion Time of 180 Calendar Days						$

Bidders Note: Contractor shall be responsible for the preparation and submittal of all Shop Drawings in accordance with FDOT Standard Specifications for Road and Bridge Construction 5-1.4.2, Work Items Requiring Shop Drawings.

Bidder:_____

Authorized Signature:_____

BID FORM - SUBCONTRACTOR PERCENTAGE

(Submit in Triplicate) Section 00300 Bid "A"

Gulf Drive at Marina Drive Intersection Improvements, Manatee County, FL

LAP Agreement #431020-1-58-01 / Project No.: 6084660

IFB #14-1226-OV

BID Based on Completion Time of 180 Calendar Days

ITEM #	FDOT ITEM	WORK BY SUBCONTRACTOR DESCRIPTION	%	MBE/WBE	DESCRIPTION OF WORK BY SUBCONTRACTOR
1	101-1	MOBILIZATION			
2	102-1	MAINTENANCE OF TRAFFIC			
3	102-14	TRAFFIC CONTROL OFFICER			
4	102-60	WORK ZONE SIGN			
5	102-76	ARROW BOARD/ADVANCE WARNING ARROW PANEL			
6	102-104	TEMPORARY SIGNALIZATION & MAINTENANCE INTERSECTION			
7	102-107-1	TEMPORARY TRAFFIC DETECTION & MAINTENANCE INTERSECTION			
8	519-78	BOLLARDS			
9	520-2-4	CONCRETE CURB (TYPE D)			
10	522-1	CONCRETE SIDEWALK (4" THICK)			
11	580-1-2	LANDSCAPE COMPLETE - LARGE PLANTS			
12	630-2-11	CONDUIT (F & I) (OPEN TRENCH)			
13	630-2-12	CONDUIT (F & I) DIRECTIONAL BORE)			
14	632-7-1	SIGNAL CABLE (F & I) (NEW OR RECONSTRUCTED INT)			
15	635-2-11	PULL & SPLICE BOX (F & I) 17" X 30" COVER SIZE			
16	632-9-1-112	POWER SERVICE (UG) (METERBASE PURCH BY CONTRACTOR)			
17	639-2-1	ELECTRICAL SERVICE WIRE (F & I)			
18	641-1	STRAIN POLES GUYING (CONCRETE)			
19	641-2-12	CONCRETE POLE (F & I) (TYPE P-11, SERVICE POLE, 36")			

Bidder:_____

Authorized Signature:_____

Subcontractor

Gulf Dr at Marina Dr

Inter. Improv.

BID FORM - SUBCONTRACTOR PERCENTAGE

(Submit in Triplicate) Section 00300 Bid "A"

Gulf Drive at Marina Drive Intersection Improvements, Manatee County, FL

LAP Agreement #431020-1-58-01 / Project No.: 6084660

IFB #14-1226-OV

BID Based on Completion Time of 180 Calendar Days

ITEM #	FDOT ITEM	WORK BY SUBCONTRACTOR DESCRIPTION	%	MBE/WBE	DESCRIPTION OF WORK BY SUBCONTRACTOR
20	649-31-104	MAST ARM (F & I) (150 MPH) (70.5 FOOT ARM)			
21	650-1-311	TRAFFIC SIGNAL 12" (F & I) (ALUM) (3 SECT., 1-WAY) LED			
22	660-4-11	VEHICLE DETECTION SYSTEM (F & I) (VIDEO) (CABINET EQUIPMENT)			
23	660-4-12	VEHICLE DETECTION SYSTEM (F & I) (VIDEO) (ABOVE GROUND EQUIPMENT)			
24	668-35	DET CABINET (INST) (TYPE V) (54" x 38" x 24")			
25	670-5-410	TRAFFIC CONTROLLER ASSEMBLY (MODIFY) (NEMA)			
26	690-10	TRAFFIC SIGNAL HEAD ASSEMBLY (REMOVE)			
27	690-32-1	POLE REMOVAL (SHALLOW (DIRECT BURIAL)			
28	690-34-1	POLE REMOVAL (DEEP) DIRECT BURIAL) (BID ALTERNATE)			
29	690-80	VEHICLE DETECTOR ASSEMBLY (REMOVAL)			
30	690-80	SPAN WIRE ASSEMBLY (REMOVAL)			
31	690-90	CONDUIT & CABLING WITHIN INTERSECTION (REMOVE)			
32	690-100	SIGNAL EQUIPMENT (MISCELLANEOUS (REMOVE)			
33	700-5-22	INTERNALLY ILLUMINATED SIGN (F & I) (12 - 18 SF)			
34	700-46-15	SIGN EXISTING REMOVE (SPAN WIRE)			

This is a duplication of the bid items where the Bidder shall state the percentage of work (of each item listed) and a description of the work which shall be performed by a subcontractor.

Bidder:_____

Authorized Signature:_____

Subcontractor
Gulf Dr at Marina Dr
Inter. Improv.

MAILING LABEL

Cut along the outside border and affix this label to your sealed Bid envelope to identify it as a "Sealed Bid". Be sure to include the name of the company submitting the Bid and the Bid due date and time where requested.

MAILING LABEL TO AFFIX TO OUTSIDE OF SEALED BID PACKAGE:

SEALED BID - DO NOT OPEN

CONTRACTOR: _____

SEALED BID NO: IFB#14-1226-OV

BID TITLE: Gulf Drive at Marina Drive, Intersection Improvements, Manatee County, FL, Project No.:6084660, FDOT Financial Project ID:431020-1-58-01

DUE DATE/TIME: _____ @ _____

FORM A

CONTRACTOR'S QUESTIONNAIRE

(Submit in Triplicate)

The Bidder warrants the truth and accuracy of all statements and answers herein contained. (Attach additional pages if necessary.)

THIS QUESTIONNAIRE MUST BE COMPLETED AND SUBMITTED WITH YOUR BID

1. Contact Information:

   License #: _____

   License Issued to: _____

   Date License Received (MM/DD/YR): _____

   Company Name: _____

   Physical Address: _____

   City: _____ State of Incorporation: _____ Zip Code: _____

   Phone Number: (___) _____ Fax Number: (___) _____

   Email address: _____

2. Bidding as: an individual ___; a partnership ___; a corporation ___; a joint venture ___

3. If a partnership, list names and addresses of partners; if a corporation, list names of officers, directors, shareholders, and state of incorporation; if joint venture, list names and address of ventures' and the same if any venture are a corporation for each such corporation, partnership, or joint venture:

   _____

   _____

   _____

   _____

4. Bidder is authorized to do business in the State of Florida: ☐ Yes ☐ No

   For how many years? _____

5. Your organization has been in business (under this firm's name) as a

   _____

   Is this firm in bankruptcy? _____

   BIDDER: _____

6. Attach a list of projects where this specific type of Work was performed.

7. Describe and give the date and County of the last three government or private work of similar scope you've completed which are similar in cost, type, size, and nature as this Project. Include contact name and phone number. Provide the budget, actual cost, size and summary of work for each project. Attach additional pages as necessary. (Note: If listing a Manatee County reference, contact person should not be directly associated with this Project.

_____

_____

_____

8. Have you ever been assessed liquidated damages under a Contract during the past five (5) years? If so, state when, where (contact name, address and phone number) and why.

_____

_____

_____

9. Have you ever failed to complete projects awarded to you? Or failed to complete projects within Contract Time? If so, state when, where (contact name, address, phone number) and why.

_____

_____

_____

10. Have you ever been debarred or prohibited from providing a Bid to a governmental entity? If yes, name the entity and describe the circumstances:

_____

_____

_____

BIDDER: _____

11. Will you subcontract any part of this Work? If so, describe which major portion(s):

_____

_____

_____

12. If any, list (with Contract amount) MBE/DBE to be utilized:

_____

_____

_____

13. What equipment do you own to accomplish this Work? (A listing may be attached)

_____

_____

_____

14. What equipment will you purchase/rent for the Work? (Specify which)

_____

_____

_____

15. List the following in connection with the Surety which is providing the bond(s):

Surety's Name: _____

Address: _____

_____

Name, address, phone number and email of Surety's resident agent for service of process in Florida:

Agent's Name: _____

Address: _____

_____

Phone: _____

Email: _____

BIDDER: _____

FORM B

PUBLIC CONTRACTING AND ENVIRONMENTAL CRIMES CERTIFICATION

SWORN STATEMENT PURSUANT TO ARTICLE V,
MANATEE COUNTY PURCHASING ORDINANCE

THIS FORM MUST BE SIGNED AND SWORN TO IN THE PRESENCE OF A NOTARY PUBLIC OR OTHER OFFICIAL AUTHORIZED TO ADMINISTER OATHS.

This sworn statement is submitted to the Manatee County Board of County Commissioners by

_____

[Print individual's name and title]

____ for _____[print name of entity submitting sworn statement]

whose business address is _____

and (if applicable) its Federal Employer Identification Number (FEIN) is _____.If the entity has no FEIN, include the Social Security Number of the individual signing this sworn statement: _____

I understand that no person or entity shall be awarded or receive a County Contract for public improvements, procurement of goods or services (including professional services) or a County lease, franchise, concession or management Contract, or shall receive a grant of County monies unless such person or entity has submitted a written certification to County that it has not:

(1) been convicted of bribery or attempting to bribe a public officer or employee of Manatee County, the State of Florida, or any other public entity, including, but not limited to the Government of the United States, any state, or any local government authority in the United States, in that officer's or employee's official capacity; or

(2) been convicted of an agreement or collusion among Bidders or prospective Bidders in restraint of freedom of competition, by agreement to bid a fixed price, or otherwise; or

(3) been convicted of a violation of an environmental law that, in the sole opinion of County's Purchasing Official, reflects negatively upon the ability of the person or entity to conduct business in a responsible manner; or

(4) made an admission of guilt of such conduct described in items (1), (2) or (3) above, which is a matter of record, but has not been prosecuted for such conduct, or has made an admission of guilt of such conduct, which is a matter of record, pursuant to formal prosecution. An admission of guilt shall be construed to include a plea of nolo contendere; or

(5) where an officer, official, agent or employee of a business entity has been convicted of or has admitted guilt to any of the crimes set forth above on behalf of such an entity and pursuant to the direction or authorization of an official thereof (including the person committing the offense, if he is an official of the business entity), the business shall be chargeable with the conduct herein above set forth. A business entity shall be chargeable with the conduct of an affiliated entity, whether wholly owned, partially owned, or one which has common ownership or a common Board of Directors. For purposes of this Form, business entities are affiliated if, directly or indirectly, one business entity controls or has the power to control another business entity, or if an individual or group of individuals controls or has the power to control both entities. Indicia of control shall include, without limitation, interlocking management or ownership, identity of interests among family members, shared organization of a business entity following the ineligibility of a business entity under this Article, or using substantially the same management, ownership or principles as the ineligible entity.

(Continued)

Any person or entity who claims that this Article is inapplicable to him/her/it because a conviction or judgment has been reversed by a court of competent jurisdiction shall prove the same with documentation satisfactory to County's Purchasing Official. Upon presentation of such satisfactory proof, the person or entity shall be allowed to contract with County.

I UNDERSTAND THAT THE SUBMISSION OF THIS FORM TO THE CONTRACTING OFFICER FOR MANATEE COUNTY IS VALID THROUGH DECEMBER 31 OF THE CALENDAR YEAR IN WHICH IT IS FILED. I ALSO UNDERSTAND THAT ANY CONTRACT OR BUSINESS TRANSACTION SHALL PROVIDE FOR SUSPENSION OF PAYMENTS, OR TERMINATION, OR BOTH, IF THE CONTRACTING OFFICER OR COUNTY ADMINISTRATOR DETERMINES THAT **SUCH PERSON OR ENTITY HAS MADE FALSE CERTIFICATION.**

_____
[Signature]

STATE OF FLORIDA
COUNTY OF _____

Sworn to and subscribed before me this ____ day of _____, 2014 by _____

Personally known _____ OR Produced identification _____
[Type of identification]

_____ My commission expires _____
Notary Public Signature

_____
[Print, type or stamp Commissioned name of Notary Public]

Signatory Requirement - In the case of a business entity other than a partnership or a corporation, this affidavit shall be executed by an authorized agent of the entity. In the case of a partnership, this affidavit shall be executed by the general partner(s). In the case of a corporation, this affidavit shall be executed by the corporate president.

FORM C

SWORN STATEMENT

THE FLORIDA TRENCH SAFETY ACT

THIS FORM MUST BE SIGNED IN THE PRESENCE OF A NOTARY PUBLIC OR BY AN OFFICER AUTHORIZED TO ADMINISTER OATHS.

1. This Sworn Statement is submitted with IFB No. **14-1226-OV**
2. This Sworn Statement is submitted by_____ whose business address is_____ and, if applicable, its Federal Employer Identification Number (FEIN) is_____. If the entity has no FEIN, include the Social Security Number of the individual signing this sworn statement _____.
3. Name of individual signing this Sworn Statement is: _____, Whose relationship to the above entity is: _____.
4. The Trench Safety Standards that will be in effect during the construction of this Project shall include, but are not limited to: Laws of Florida, Chapters 90-96, TRENCH SAFETY ACT, and OSHA RULES AND REGULATIONS 29 CFR 1926.650 Subpart P, effective October 1, 1990.
5. The undersigned assures that the entity will comply with the applicable Trench Safety Standards and agrees to indemnify and hold harmless County and Engineer, and any of their agents or employees from any claims arising from the failure to comply with said standard.
6. The undersigned has appropriated the following costs for compliance with the applicable standards:

Trench Safety Measure (Description)	Units of Measure (LF, SY)	Unit Quantity	Unit Cost	Extended Cost
a. _____	_____	_____	$_____	_____
b. _____	_____	_____	$_____	_____
c. _____	_____	_____	$_____	_____
d. _____	_____	_____	$_____	_____

7. The undersigned intends to comply with these standards by instituting the following procedures:

_____

_____

_____

THE UNDERSIGNED, in submitting this Bid, represents that they have reviewed and considered all available geotechnical information and made such other investigations and tests as they may deem necessary to adequately design the trench safety system(s) to be utilized on this Project.

_____

(AUTHORIZED SIGNATURE / TITLE)

SWORN to and subscribed before me this _____ day of _____, 2014.

(Impress official seal)

Notary Public, State of Florida: _____

My commission expires: _____

R. B. "Chips" Shore

CLERK OF THE CIRCUIT COURT AND COMPTROLLER OF MANATEE COUNTY

1115 Manatee Avenue West, Bradenton, Florida 34205 - Phone (941) 749-1800 – Fax (941) 741-4082
P.O. Box 25400, Bradenton, Florida 34206 - www.manateeclerk.com

E PAYABLES APPLICATION

Company name_____

Contact person_____

Phone number_____

Email Address_____

FINANCE USE ONLY

Open orders: YES or NO
PEID _____
CREATE DATE _____
CONFIRMED WITH _____
Name and phone number

IFAS _____

BANK _____

INITIALS_____

Return completed form to:
Via email to:
lori.bryan@manateeclerk.com
Via fax to: (941) 741-4011
Via mail:
PO Box 1000
Bradenton, Fl 34206

Revised: June 26, 2013

SECTION E

GENERAL CONDITIONS

ARTICLE 1. DEFINITIONS

Whenever used in the Contract Documents, the following terms have the meaning indicated which are applicable to both the singular and plural thereof:

Addendum - Written or graphic instruments issued prior to the opening of Bids which clarify or change the Bid Documents.

Administrative Contract Adjustment (ACA) – A minor change to a Contract, which is less than 10% of the Contract Price or less than 20% of the Contract Time, and does not require Board approval. (Reference Resolution R-07-189)

Application for Payment - The form accepted by the Project Representative which is to be used by Contractor in requesting progress or final payments and which is to include such supporting documentation as is required by the Contract Documents.

Award - Acceptance of the Bid from the person, firm, or corporation which in the County's sole and absolute judgment will under all circumstances best serve the public interest. Award shall be made in accordance with Chapter 2-26 of the Manatee County Code.

Bid - The Offer of the Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

Bid Bond – An insurance agreement, accompanied by a monetary commitment, by which a third party (the Surety) accepts liability and guarantees that the Bidder will not withdraw the Bid.

Bidder - One who submits a Bid directly to the County, as distinct from a Sub-bidder, who submits a Bid to a Bidder.

Bid Documents - Consists of the Invitation for Bid, which includes but is not limited to the Bid Form, drawings, technical Specifications, terms and conditions, and the proposed Contract Documents (including all Addenda issued prior to receipt of Bids); and becomes a part of the resulting Contract.

Bid Summary – Specifications or scope of Work that specifically describes the Work to be done for this Project.

Bond Rider – A Bond Rider increases the Performance Bond coverage to ensure responsibility of the Contractor in executing the Work for the County in consideration of the increased value resulting from an approved change in the Contract amount.

Change Order - A document recommended by the Project Representative which is signed by Contractor and County and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Time, issued on or after the Effective Date of the Contract.

Compensable Delay - Any delay beyond the control and without the fault or negligence of the Contractor resulting from County-caused changes in the Work, differing site conditions, suspensions of the Work, or termination for convenience by County.

Contract - The written Contract between County and Contractor covering the Work to be performed; other Contract Documents are attached to the Contract and made a part thereof as provided therein.

Contract Contingency - A monetary allowance used at the County's discretion, which is part of the total sum of the Contract that allows for minor changes in the Contract that do not change the initial Scope of Work, including Contract Price and Contract Time.

Contract Documents - The Contract, Invitation for Bid in its entirety, Public Construction Bond Form and Insurance Certificate(s), Drawings/Plans, Addenda (which pertain to the Bid Documents), Contractor's Bid Form (including documentation accompanying the Bid and any post-Bid documentation submitted prior to the Notice of Award), and Reports, together with all written Change Orders and other documents amending, modifying or supplementing the Contract Documents issued on or after the Effective Date of the Contract.

Contract Price - The monies payable by County to Contractor under the Contract Documents as stated in the Contract.

Contract Time - The number of days or the date stated in the Notice to Proceed for the completion of the Work.

Contractor - The person, firm or corporation with whom County has entered into a Contract.

Days - All references to days are to be considered calendar days except as specified differently.

Defective - An adjective which when modifying the Work refers to work that is unsatisfactory, faulty or deficient, or does not conform to the Contract Documents, or does not meet the requirements of any inspection, reference standard, test or approval referred to in the Contract Documents, or has been damaged prior to Project Representative's recommendation of final payment (unless responsibility for the protection thereof has been assumed by County).

Drawings - The drawings which show the character and Scope of Work to be performed and which have been prepared or approved by Engineer and are referred to in the Bid and Contract Documents.

Effective Date of the Contract - The date indicated in the Contract on which it becomes effective (date of execution).

Engineer – Licensed professional who is responsible for the preparation, signing, dating, sealing and issuing of any engineering document(s) for any engineering service or Work.

Excusable Delay - Any delay beyond the control and without the negligence of the Contractor, the County, or any other Contractor caused by events or circumstances such as, but not limited to, acts of God or of the public enemy, fires, floods, freight embargoes, acts of government other than County or epidemics. Labor disputes and above average rainfall shall give rise only to Excusable Delays.

Field Directive - A written order issued by an authorized County Representative which approves changes in the Work, but does not involve a change in the initial Scope of Work, including the Contract Price and the Contract Time. A Field Directive must be issued by an authorized County Representative to authorize use of Contract Contingency funds.

Final Completion – The Work (including items defined on the Punch List) has been completed, accepted in writing by the County, approved as-builts have been received, and is ready for final payment.

Float or Slack Time - The time available in the progress schedule during which an unexpected activity can be completed without delaying Substantial Completion of the Work.

Inexcusable Delay - Any delay caused by events or circumstances within the control of the Contractor, such as inadequate crewing, slow submittals, etc., which might have been avoided by the exercise of care, prudence, foresight, or diligence on the part of the Contractor.

Information (Pre-Bid) Conference – A meeting held by the Purchasing Division with potential Bidders, prior to the opening of the solicitation, for the purpose of answering questions, clarifying ambiguities, and responding to general issues in order to establish a common basis for understanding all of the requirements of the solicitation; may result in the issuance of an Addendum.

Material Breach – A substantial failure in the performance of the Contract, as to give the affected party the right to remedies available in the Contract.

Non-prejudicial Delay - Any delay impacting a portion of the Work within the available total Float or Slack Time and not necessarily preventing completion of the Work within the Contract Time.

Notice of Award - The written notice to the Successful Bidder stating Award has been approved by the Board of County Commissioners; or by the Purchasing Official in accordance with Chapter 2-26 of the Manatee County Code.

Notice of Intent to Award - The written notice to the apparent Successful Bidder stating Award has been recommended with final Award to be authorized by the Purchasing Official or Board of County Commissioners, as appropriate.

Notice to Proceed - Written notice by County (after execution of Contract) to Contractor fixing the date on which the Contract Time will commence to run and on which Contractor shall start to perform (ten (10) days from date of such notice) Contractor's obligations under the Contract Documents.

Payment Bond – An instrument, issued by a Surety that guarantees that Subcontractors will be paid for labor expended on the Contract.

Performance Bond – An instrument executed subsequent to Award by the successful Contractor that protects the County from loss due to Contractor's inability to complete the Contract as agreed.

Preconstruction Conference - Prior to starting the Work, a meeting scheduled by County with Contractor to review the Work schedules, to establish procedures for handling Shop Drawings and other submissions, for processing periodical pay estimates, and such other matters as may be pertinent to the project.

Prejudicial Delay - Any excusable or Compensable Delay impacting the Work and exceeding the total float time available in the progress schedule, thus preventing completion of the Work within the Contract Time unless the Work is accelerated.

Pre-operation Testing - All field inspections, installation checks, water tests, performance tests and necessary corrections required of Contractor to demonstrate that individual components of the Work have been properly constructed and do operate in accordance with the Contract Documents for their intended purposes.

Project - The total construction of which the Work to be provided under the Contract Documents (may be the whole or a part as indicated elsewhere in the Contract Documents).

Project Representative - The authorized representative of Manatee County who is assigned to the project or any part thereof.

Punch List – A list of minor deficiencies or additional Work that does not prohibit achieving Substantial Completion yet must be completed before Final Completion of the Contract can be achieved.

Retainage – A certain percentage, identified in the solicitation document, is withheld from payment due to the Contractor until the Work is fully completed and accepted by County.

Schedule of Values – In the case of a total, lump sum Bid, unit prices shall be established for this Contract by the submission of a Schedule of Values. In the case of an itemized Bid, unit prices are the prices bid. The Contractor shall submit a Schedule of Values within ten (10) days of Notice to Proceed date. The schedule shall include quantities and prices of items equaling the Total Offer and will subdivide the Work into components in sufficient detail to serve as the basis for progress payments during construction. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work. Upon request of the County, the Contractor shall support the values with data which will substantiate their correctness.

Shop Drawings - All drawings, diagrams, illustrations, schedules and other data which are specifically prepared by or for Contractor to illustrate some portion of the Work and all illustrations, brochures, standard schedules, performance charts, instructions, diagrams and other information prepared by a Supplier and submitted by Contractor to illustrate material or equipment for some portion of the Work.

Special Provisions: As required to define Work or procedures not covered in the standard Specifications, and as necessary to supplement or modify items in the standard Specifications.

Subcontractor - An individual or corporation having a direct contact with Contractor or with any other Subcontractor for the performance of a part of the Work at the site. Such person or firm has contractual relations with the Contractor, not with the County.

Substantial Completion - The stage in the progress of the Work (or a specified portion thereof) is sufficiently complete in accordance with the Contract Documents so the Work (or a specified portion thereof) can be utilized for the intended purpose.

Successful Bidder - The lowest, responsible and responsive Bidder to whom an Award is made.

Supplier - A manufacturer, fabricator, Supplier, distributor, material man or vendor.

Surety – A pledge or guarantee by an insurance company, bank, individual or corporation on behalf of the Bidder which protects against default or failure of the principal to satisfy the contractual obligations.

Underground Facilities - All pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels or other such facilities or attachments and any encasement containing such facilities which have been installed underground to furnish any of the following services or materials: electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, sewage and drainage removal, traffic or other control systems or water.

Unit Price Work - Work to be paid for on the basis of unit prices.

Work - The entire completed construction or the various separately identifiable parts thereof required to be furnished under the Contract Documents. Work is the result of performing services, furnishing labor and furnishing and incorporating materials and equipment into the construction, all as required by the Contract Documents.

Work Directive Change - A written directive to Contractor, issued on or after the Effective Date of the Contract and signed by County and recommended by Project Representative ordering an addition, deletion or revision in the Work, or responding to differing or unforeseen physical conditions under which the Work is to be performed or to emergencies. A Work Directive Change itself may not change the Contract Price or Contract Time; but is evidence that the parties expect that the change directed or documented by a Work Directive Change will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Time.

Written Amendment - A Written Amendment of the Contract Documents, signed by County and Contractor on or after the Effective Date of the Contract and normally dealing with the non-engineering or non-technical rather than strictly Work related aspects of the Contract Documents.

ARTICLE 2. PRELIMINARY MATTERS

Computation of Time: When time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or legal holiday, such day will be omitted from the computation.

2.1 The Contractor must submit a proposed schedule of the Work at the Preconstruction Conference. The purpose of this schedule is to enable the County to govern the Work, to protect the functions of the local government and its citizens and to aid in providing appropriate surveillance. The County shall have the right to reschedule Work provided such rescheduling is in accordance with the remainder of the terms of the Contract. The schedule shall show, as a minimum, the approximate dates on which each segment of the Work is expected to be started and finished, the proposed traffic flows during each month, the anticipated earnings by the Contractor for each month and the approximate number of crews and equipment to be used. The County, after necessary rescheduling and obtaining additional information for specific

purposes, shall review and approve the schedule. The Contractor shall also forward to the County, as soon as practicable after the first day of each month, a summary report of the progress of the various parts of the Work under the Contract, in fabrication and in the field, stating the existing status, estimated time of completion and cause of delay, if any. Together with the summary report, the Contractor shall submit any necessary revisions to the original schedule for the County's review and approval. In addition, more detailed schedules may be required by the County for daily traffic control.

2.2 A Notice to Proceed may be given at any time within thirty (30) days after the Effective Date of the Contract. The Contract Time will commence at the time specified in such notice. Contractor shall start to perform the Work on the date specified in the Notice to Proceed, but no Work shall be done at the site prior to the date on which the Contract Time commences to run.

2.3 If at any time the materials and appliances to be used appear to the County as insufficient or improper for securing the quality of Work required or the required rate of progress, the County may order the Contractor to increase his efficiency or to improve the character of his Work and the Contractor shall conform to such an order. The failure of the County to demand any increase of such efficiency of any improvement shall not release the County from its obligation to secure the quality of Work or the rate of progress necessary to complete the Work within the limits imposed by the Contract. The County may require the Contractor to remove from the Work such employees as the County deems incompetent, careless, insubordinate or otherwise objectionable, or whose continued employment on the Work is deemed to be contrary to the County's interest.

2.4 The County reserves the right to let other Contracts in connection with this Work. The Contractor shall afford other Contractors reasonable opportunity for the introduction and storage of their materials and execution of their Work, and promptly connect and coordinate the Work with theirs.

ARTICLE 3. CONTRACT DOCUMENTS: INTENT, AMENDING, RE-USE

3.1 The Contract Documents comprise the entire Contract between County and Contractor concerning the Work. The Contract Documents are complementary; what is called for by one is as binding as if called for by all. The Contract Documents will be construed in accordance with the laws and ordinances of the State of Florida and Manatee County.

Should a conflict exist within the Contract Documents, the precedence in order of authority is as follows: 1) Bid Summary, 2) Special Conditions, 3) General Conditions, and 4) Drawings.

Note: Computed dimensions shall govern over scaled dimensions.

3.2 It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents. Any work, materials or equipment that may reasonably be inferred from the Contract Documents as being required to produce the intended result will be supplied whether or not specifically called for in the Contract Documents. When words which have a well-known technical or trade meaning are used to describe Work, materials, or equipment, such words shall be interpreted in accordance with that meaning. Reference to standard Specifications, manuals or codes of any technical society, organization or association, or to the laws or regulations of any governmental authority, whether such reference be specific or by implication, shall mean the latest standard specification, manual, code or laws or regulations in effect at the time of opening of Bids, except as may be otherwise specifically stated. However, no provision of any referenced standard specification, manual or code (whether or not specifically incorporated by reference in the Contract Documents) shall be effective to change the duties and responsibilities of County, Contractor or Engineer, or any of their agents or employees from those set forth in the Contract Documents.

3.3 The Contract Documents may be amended to provide for additions, deletions and revisions in the Work or to modify the terms and conditions thereof in one or more of the following ways:

3.3.1 A Written Amendment

3.3.2 A Change Order

3.3.3 An Administrative Contract Adjustment (ACA)

3.3.4 A Work Directive Change

3.4 In addition, the requirements of the Contract Documents may be supplemented and minor variations and deviations in the Work may be authorized in one or more of the following ways:

3.4.1 Contract Contingency Work – Field Directive

3.4.2 Engineer's approval of a Shop Drawing or sample

ARTICLE 4. CONTRACTOR'S RESPONSIBILITIES

4.1 Contractor shall keep on the Work at all times during its progress a competent resident superintendent; who shall be the Contractor's representative at the site and shall have authority to act on behalf of Contractor. All communications given to the superintendent shall be as binding as if given to Contractor.

4.2 Contractor shall provide competent, suitable qualified personnel to survey and lay out the Work and perform construction as required by the Contract

Documents. Contractor shall at all times maintain good discipline and order at the site. Except in connection with the safety or protection of persons or the Work or property at the site or adjacent thereto and except as otherwise indicated in the Contract Documents, all Work at the site shall be performed during regular working hours and Contractor will not permit overtime Work or the performance of Work on Saturday, Sunday or legal holiday without County's written consent given after prior notice to Engineer (at least seventy-two (72) hours in advance).

4.2.1 Contractor shall pay for all additional engineering charges to the County for any overtime Work which may be authorized. Such additional engineering charges shall be a subsidiary obligation of Contractor and no extra payment shall be made by County on account of such overtime Work. At County's option, overtime costs may be deducted from Contractor's monthly payment request or Contractor's Retainage prior to release of final payment.

4.3 Unless otherwise specified, Contractor shall furnish and assume full responsibility for all bonds, insurance, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities and all other facilities and incidentals necessary for the furnishing, performance, testing, start-up and completion of the Work.

4.4 All materials and equipment shall be of good quality and new, except as otherwise provided in the Contract Documents. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the kind and quality of materials and equipment. All materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with the instruction of the applicable Supplier except as otherwise provided in the Contract Documents.

4.5 Contractor shall be fully responsible to County for all acts and omissions of the Subcontractors, Suppliers and other persons and organizations performing or furnishing any of the Work under a direct or indirect Contract with Contractor just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents shall create any contractual relationship between County or Engineer and any such Subcontractor, Supplier or other person or organization, nor shall it create any obligation on the part of County to pay or to see to the payment of any monies due any such Subcontractor, Supplier or other person or organization.

4.6 Permits: Unless otherwise provided, Contractor shall obtain and pay for all construction permits and licenses. County shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all

governmental charges and inspection fees necessary for the prosecution of the Work.

4.7 During the progress of the Work, Contractor shall keep the premises free from accumulation of waste materials rubbish and other debris resulting from the Work. At the completion of the Work, Contractor shall remove all waste materials, rubbish, and debris from and about the premises as well as all tools, appliances, construction equipment and machinery and surplus materials and shall leave the site clean and ready for occupancy by County. Contractor shall restore to original conditions all property not designated for alteration by the Contract Documents.

4.8 Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

4.9 Safety and Protection: Contractor shall comply with the Florida Department of Commerce Safety Regulations and any local safety regulations. Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Contractor shall take all necessary precautions for the safety of and shall provide the necessary protection to prevent damage, injury or loss to:

4.9.1 all employees on the Work and other persons and organizations who may be affected thereby;

4.9.2 all the Work and materials and equipment to be incorporated therein, whether in storage on or off the site; and

4.9.3 other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities and Underground Facilities not designated for removal, relocation or replacement in the course of construction.

4.9.4 Contractor shall comply with all applicable laws and regulations of any public body having jurisdiction for the safety of persons or property or to protect them from damage, injury or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall provide and maintain all passageways, guard fences, lights and other facilities for the protection required by public authority or local conditions. Contractor shall provide reasonable maintenance of traffic way for the public and preservation of the County's business, taking into full consideration all local conditions. Contractor's duties and responsibilities for the safety and protection of the Work shall continue until such time as all the Work is completed.

4.10 Emergencies: In emergencies affecting the safety or protection of persons or the Work or property at the site or adjacent thereto, Contractor, without special instruction or authorization from Engineer or County, is obligated to act to prevent threatened damage, injury or loss. Contractor shall give County prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby. If County determines that a change in the Contract Documents is required because of the action taken in response to an emergency, a Work Directive Change or Change Order will be issued to document the consequences of the changes or variation.

4.11 For substitutes not included with the Bid, but submitted after the Effective Date of the Contract, Contractor shall make written application to Engineer for acceptance thereof, certifying that the proposed substitute will perform adequately the functions and achieve the results called for by the general design, be similar and of equal substance to that specified and be suited to the same use as that specified. The application will also contain an itemized estimate of all costs and delays or schedule impacts that will result directly or indirectly from review, acceptance and provisions of such substitute, including costs of redesign and claims of other Contractors affected by the resulting change, all of which will be considered by the Engineer in evaluating the proposed substitute. Engineer may require Contractor to furnish at Contractor's expense, additional data about the proposed substitute. In rendering a decision, County/Engineer and Contractor shall have access to any available Float or Slack Time in the construction schedule. In the event that substitute materials or equipment not included as part of the Bid, but proposed after the Effective Date of the Contract, are accepted and are less costly than the originally specified materials or equipment, then the net difference in cost shall be credited to the County and an appropriate Change Order executed.

4.11.1 If a specific means, method, sequence, technique or procedure of construction is indicated in or required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, sequence, technique or procedure of construction acceptable to Engineer if Contractor submits sufficient information to allow Engineer to determine that the substitute proposed is equivalent to that indicated or required by the Contract Documents.

4.11.2 Engineer will be allowed a reasonable time within which to evaluate each proposed substitute. Engineer will be the sole judge of acceptability and no substitute will be ordered, installed or utilized without Engineer's prior written acceptance which will be evidenced by either a Change Order or an approved shop drawing. County may require Contractor to furnish at Contractor's expense a special performance guarantee or other Surety with respect to any substitute.

4.11.3 Contractor shall reimburse County for the charges of Engineer and Engineer's consultants for evaluating each proposed substitute submitted after the Effective Date of the Contract and all costs resulting from any delays in the Work while the substitute was undergoing review.

4.12 The Contractor shall furnish, free of charge, all labor, stakes, surveys, batter boards for structures, grade lines and other materials and supplies and shall set construction stakes and batter boards for establishing lines, position of structures, slopes and other controlling points necessary for the proper prosecution of the construction Work. Where rights-of-way, easements, property lines or any other conditions which make the lay-out of the project or parts of the project critical are involved, the Contractor will employ a competent surveyor who is registered in the State of Florida for lay-out and staking. These stakes and marks shall constitute the field control by and in accord with which the Contractor shall govern and execute the Work. The Contractor will be held responsible for the preservation of all stakes, marks and if for any reason any of the stakes or marks or batter boards become destroyed or disturbed, they will be immediately and accurately replaced by the Contractor.

4.13 The Contractor has, by careful examination, satisfied himself as to the nature and location of the Work and all other matters which can in any way affect the Work under this Contract, including, but not limited to details pertaining to boring, as shown on the drawings, are not guaranteed to be more than a general indication of the materials likely to be found adjacent to holes bored at the site of the Work, approximately at the locations indicated. The Contractor shall examine boring data, where available, and make his own interpretation of the subsoil investigations and other preliminary data, and shall base his Bid on his own opinion of the conditions likely to be encountered. In no event shall an extension of time be considered for any conditions that existed at the time of bidding, nor shall the Contractor receive extra compensation for completion of the project as intended by the drawings and in keeping with the Contact documents. No verbal agreement or conversation with any officer, agent or employee of the County, before or after the execution of this Contract, shall affect or modify any of the terms or obligations herein contained.

4.14 If the Contractor, in the course of the Work, finds that the drawings and/or Contract Documents cannot be followed, he shall immediately inform the County in writing, and the County shall promptly check the accuracy of the information. Any Work done after such discovery, until any necessary changes are authorized, will be done at the Contractor's risk.

ARTICLE 5. COUNTY'S RESPONSIBILITIES

5.1 County shall furnish the data required of County under the Contract Documents promptly and shall make payments to the Contractor within a reasonable time after the Work has been accepted by the County. Payment shall be made no more than twenty (20) business days if County is its own Engineer of Record or twenty-five (25) business days if outside agent approval is required after the pay estimate has been approved by the agent for the County. The form of all submittals, notices, Change Orders and other documents permitted or required to be used or transmitted under the Contract Documents shall be determined by the County/Engineer. Standard County forms shall be utilized.

5.2 The County shall provide the lands upon which the Work under this Contract is to be done, except that the Contractor shall provide all necessary additional land required for the erection of temporary construction facilities and storage of his materials, together with right of access to same.

5.3 The County shall have the right to take possession of and use any completed portions of the Work, although the time for completing the entire Work or such portions may not have expired, but such taking possession and use shall not be deemed an acceptance of any Work not completed in accordance with the Contract Documents.

ARTICLE 6. CHANGES IN THE WORK

6.1 Without invalidating the Contract and without notice to any Surety, County may, at any time, order additions, deletions or revisions in the Work. These will be authorized by a Written Amendment, a Change Order, or a Work Directive Change. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

6.2 Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Time with respect to any Work performed that is not required by the Contract Documents as amended, modified and supplemented.

6.3 County and Contractor shall execute appropriate Change Orders, or Written Amendments, covering changes in the Work which are ordered by County, or which may be required because of acceptance of defective Work.

6.4 At any time Engineer may request a quotation from Contractor for a proposed change in the Work and within twenty-one (21) calendar days after receipt, Contractor shall submit a written and detailed proposal for an increase or decrease in the Contract Price or Contract Time for the proposed change. Engineer shall have twenty-one (21) calendar days after receipt of the detailed proposal to respond in writing. The proposal shall include an itemized estimate of all costs and time for performance that will result directly or indirectly from the proposed change. Unless otherwise directed, itemized estimates shall be in

sufficient detail to reasonably permit an analysis by Engineer of all material, labor, equipment, subcontracts, overhead costs and fees, and shall cover all Work involved in the change, whether such Work was deleted, added, changed or impacted. Notwithstanding the Request for Quotation, Contractor shall carry on the Work and maintain the progress schedule. Delays in the submittal of the written and detailed proposal will be considered non-prejudicial.

ARTICLE 7. CHANGE OF CONTRACT PRICE

7.1 The Contract Price constitutes the total compensation (subject to authorized adjustments) payable to Contractor for performing the Work. All duties, responsibilities and obligations assigned to or undertaken by Contractor shall be at his expense without change in the Contract Price.

7.2 The Contract Price may only be changed by Change Order or by a Written Amendment. Any claim for an increase or decrease in the Contract Price shall be based on written notice delivered by the party making the claim to the other party. Notice of the amount of the claim with supporting data shall be delivered within ten (10) days from the beginning of such occurrence and shall be accompanied by claimant's written statement that the amount claimed covers all known amounts (direct, indirect and consequential) to which the claimant is entitled as a result of the occurrence of said event.

7.3 The value of any Work covered by a Change Order or of any claim for an increase or decrease in the Contract Price shall be determined in one of the following ways, at the County's discretion:

7.3.1 Where the Work involved is covered by unit prices contained in the Contract Documents, cost will be determined by application of such unit prices to the quantities of the items involved.

7.3.2 By mutual acceptance of lump sum.

7.3.3 On the basis of the cost of the Work, plus a 15% Contractor's fee for overhead and profit. (Contractor shall submit an itemized cost breakdown together with supporting data.)

7.4 Either County or Contractor may make a claim for an adjustment in the Contract Price. The unit price of an item of Unit Price Work shall be subject to re-evaluation and adjustment under the following conditions:

7.4.1 If the total cost of a particular item of Unit Price Work amounts to 5% or more of the Contract Price and the variation in the quantity of the particular item of Unit Price Work performed by Contractor differs by more than 15% from the estimated quantity of such item indicated in the Contract; and

7.4.2 If there is no corresponding adjustment with respect to any other item of Work; and

7.4.3 If a Contractor believes that it has incurred additional expense as a result thereof; or

7.4.4 If County believes that the quantity variation entitles it to an adjustment in the unit price; or

7.4.5 If the parties are unable to agree as to the effect of any such variations in the quantity of Unit Price Work performed.

ARTICLE 8. CHANGE OF CONTRACT TIME

8.1 Contract Time may only be changed by a Change Order or a Written Amendment. Any claim for an extension or shortening of the Contract Time shall be based on written notice delivered by the party making the claim to the other party. Notice of the extent of the claim with supporting data shall be delivered within fifteen (15) days from detection or beginning of such occurrence and shall be accompanied by the claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant has reason to believe it is entitled as a result of the occurrence of said event.

8.2 The Contract Time will be extended in an amount equal to time lost due to delays beyond the control of Contractor. Such delays shall include, but not be limited to, acts or neglect by County or others performing additional Work; or to fires, floods, epidemics, abnormal weather conditions or acts of God.

8.3 All time limits stated in the Contract Documents are of the essence.

ARTICLE 9. TEST & INSPECTION

If any Work (including work of others) that is to be inspected, tested, or approved is covered without written concurrence of Engineer, it must, if requested by Engineer, be uncovered for observation. Such uncovering shall be at Contractor's expense unless Contractor has given Engineer timely notice of Contractor's intention to cover the same and Engineer has not acted with reasonable promptness in response to such notice. Neither observations by Engineer nor inspections, tests, or approvals by others shall relieve Contractor from Contractor's obligations to perform the Work in accordance with the Contract Documents.

ARTICLE 10. SUSPENSION OR TERMINATION OF WORK

10.1 County reserves the right to suspend the Work, or any portion thereof, at any time without cause for a period not to exceed ninety (90) days by written notice to Contractor, which will fix the date on which Work will be resumed. Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Time, or both, directly attributable to any suspension if Contractor makes an approved claim therefore.

10.1.1 If Work is suspended by County for a period that exceeds ninety (90) days; or if Work is suspended by an order of court or other public authority; or if County fails to pay Contractor, then Contractor may, upon seven (7) days written notice to County, terminate the Contract and recover payment for all Work executed.

10.1.2 In lieu of terminating the Contract, if the Engineer has failed to act on any Application for Payment or County has failed to make any payment as aforesaid, Contractor may, upon seven (7) days written notice to County, stop the Work until payment of all amounts then due have been received.

10.2 County reserves the right, after giving seven (7) days written notice, to terminate this Contract if:

10.2.1 Contractor persistently fails to perform the Work in accordance with the Contract Documents;

10.2.2 Contractor disregards laws or regulations of any public body having jurisdiction;

10.2.3 Contractor commences a voluntary case under any chapter of the Bankruptcy Code or any similar action by filing a petition under any other federal or state law relating to bankruptcy or insolvency;

10.2.4 Contractor has a petition filed against them under any chapter of the Bankruptcy Code or similar relief under any other federal or state law;

10.3 County may exclude Contractor from the site and take possession of the Work and of all Contractor's tools, construction equipment and machinery at the site and use same to the full extent they could be used (without liability to Contractor for trespass or conversion); incorporate in the Work all materials and equipment stored at the site or for which County has paid Contractor but which are stored elsewhere, and finish the Work as County may deem expedient.

10.3.1 Contractor shall not be entitled to receive any further payment beyond an amount equal to the value of material and equipment not incorporated in the Work, but delivered and suitably stored, less the aggregate of payments previously made.

10.3.2 If the direct, indirect and consequential costs of completing the Work exceed the unpaid balance of the Contract Price, Contractor shall pay the difference to County. Such costs incurred by County shall be verified by County and incorporated in a Change Order; but in finishing the Work, County shall not be required to obtain the lowest figure for the Work

performed. Contractor's obligations to pay the difference between such costs and such unpaid balance shall survive termination of this Contract.

10.4 In the event sufficient budgeted funds are not available for a new fiscal year, County shall notify Contractor of such occurrence and Contract shall terminate on the last day of the current fiscal year without penalty or expense to County.

10.5 Failure of Contractor to comply with any of the provisions of this Contract shall be considered a Material Breach of Contract and shall be cause for immediate termination of Contract at the discretion of County.

10.6 In addition to all other legal remedies available to County, County reserves the right to terminate and obtain from another source, any commodities or services which have not been delivered within the Contract Time as stated in the Contract Documents.

ARTICLE 11. CONTRACT CLAIMS & DISPUTES

11.1 Except as otherwise provided herein, any dispute arising under this Contract shall be decided by the Purchasing Official in accordance with Section 2-26-63 of the Manatee County Code subject to an administrative hearing process provided in 2-26-64. The decision of the Board of County Commissioners in accordance with Section 2-26-64 of the Manatee County Code shall be the final and conclusive County decision subject to exclusive judicial review in the circuit court by a petition for certiorari.

ARTICLE 12. RESIDENT PROJECT REPRESENTATIVE - DUTIES, RESPONSIBILITIES

12.1 The Resident Project Representative is the Engineer's Agent, who will act as directed by and under the supervision of the Engineer, and who will confer with County regarding his actions. Resident Project Representative's dealing in matters pertaining to the on-site Work shall, in general, be only with the County and Contractor and dealings with Subcontractors shall only be through or with the full knowledge of Contractor.

12.2 Resident Project Representative will:

12.2.1 Review the progress schedule, schedule of shop drawing submissions and Schedule of Values prepared by Contractor and consult with County concerning their acceptability.

12.2.2 Attend Preconstruction Conferences. Arrange a schedule of progress meetings and other job conferences as required in consultation with County and notify those expected to attend in advance. Attend meetings and maintain and circulate copies of minutes thereof.

12.2.3 Serve as County's liaison with Contractor, working principally through Contractor's superintendent and assist him in understanding the intent of the Contract Documents. As requested by Contractor, assist in obtaining additional details or information when required at the job site for proper execution of the Work.

12.2.4 Receive and record date of receipt of Shop Drawings and samples, receive samples which are furnished at the site by Contractor and notify Engineer of their availability for examination.

12.2.5 Advise Engineer and Contractor or his superintendent immediately of the commencement of any Work requiring a shop drawing or sample submission if the submission has not been approved by the County.

12.2.6 Conduct on-site observations of the Work in progress to assist Engineer in determining if the Work is proceeding in accordance with the Contract Documents and that completed Work will conform to the Contract Documents.

12.2.7 Report to County whenever he or she believes that any Work is unsatisfactory, faulty or defective or does not conform to the Contract Documents, or does not meet the requirements of any inspections, tests or approvals required or if Work has been damaged prior to final payment; and advise Contractor when he believes Work should be corrected or rejected or should be uncovered of observation or requires special testing, inspection or approval.

12.2.8 Verify that tests, equipment and system start-ups and operating and maintenance instructions are conducted as required by the Contract Documents and in the presence of the required personnel, and that Contractor maintains adequate records thereof; observe, record and report to Engineer appropriate details relative to the test procedures and start-ups.

12.2.9 Accompany visiting inspectors representing public or other agencies having jurisdiction over the project; record the outcome of these inspections and report to County.

12.2.10 Transmit to Contractor, Engineer's clarifications and interpretations of the Contract Documents.

12.2.11 Consider and evaluate Contractor's suggestions or modifications in drawings or Contract Documents and report them with recommendations to County.

12.2.12 Maintain at the job site orderly files for correspondence, reports of job conferences, Shop Drawings and sample submissions, reproductions of original Contract Documents including all Addenda, Change Orders, field orders, additional drawings issued subsequent to the execution of the Contract, Engineer's clarifications and interpretations of the Contract Documents, progress reports and other project related documents.

12.2.13 Keep a diary or log book, recording hours on the job site, weather conditions, data relative to questions of extras or deductions; list of visiting officials and representatives or manufacturers, fabricators, Suppliers and distributors; daily activities, decisions, observations in general and specific observations in more detail as in the case of observing test procedures. Send copies to County.

12.2.14 Record names, addresses and telephone numbers of all Contractors, Subcontractors and major Suppliers of materials and equipment.

12.2.15 Furnish Engineer periodic reports as required of progress of the Work and Contractor's compliance with the approved progress schedule and schedule of shop drawing submissions.

12.2.16 Consult with Engineer in advance of scheduling major tests, inspections or start of important phases of the Work.

12.2.17 Report immediately the occurrence of any accident.

12.2.18 Review applications for payment with Contractor for compliance with the established procedure for their submission and forward them with recommendations to Engineer, noting particularly their relation to the Schedule of Values, Work completed and materials and equipment delivered at the site but not incorporated in the Work.

12.2.19 During the course of the Work, verify that certificates, maintenance and operations manuals and other data required to be assembled and furnished by Contractor are applicable to the items actually installed, and deliver this material to County for his review prior to final acceptance of the Work.

12.2.20 Before Engineer issues a certificate of Substantial Completion, submit to Contractor a list of observed items requiring completion or correction.

12.2.21 Conduct final inspection in the company of County and/or Engineer and Contractor and prepare a Punch List of items to be completed or corrected. Reference Florida Statutes § 218.735(7).

12.2.22 Verify that all items on final list have been completed or corrected and make recommendations to County concerning acceptance.

12.3 Except upon written instructions of Engineer, Resident Project Representative:

12.3.1 Shall not authorize any deviation from the Contract Documents or approve any substitute materials or equipment;

12.3.2 Shall not exceed limitations on Engineer's authority as set forth in the Contract Documents;

12.3.3 Shall not undertake any of the responsibilities of Contractor, Subcontractors or Contractor's superintendent, or expedite the Work;

12.3.4 Shall not advise on or issue directions relative to any aspect of the means, methods, techniques, sequences or procedures of construction unless such is specifically called for in the Contract Documents;

12.3.5 Shall not advise on or issue directions as to safety precautions and programs in connection with the Work;

12.3.6 Shall not authorize County to occupy the project in whole or in part; and

12.3.7 Shall not participate in specialized field or laboratory tests.

ARTICLE 13. APPRENTICES

13.1 If successful Contractor employs apprentices, he shall be governed and comply with the provisions of Fla.Stat. § 446.011.

NOTE: The form of all submittals, notices, Change Orders and other documents permitted or required to be used or transmitted under the Contract shall be determined by the County. Standard County forms shall be utilized.

END OF SECTION E

SECTION F

FORM OF CONTRACT BETWEEN THE COUNTY OF MANATEE, FLORIDA AND CONTRACTOR AS IDENTIFIED BELOW ON THE BASIS OF A STIPULATED UNIT COST CONTRACT PRICE

This CONTRACT is made and entered into by and between the COUNTY OF MANATEE, a political subdivision of the State of Florida, hereinafter referred to as "COUNTY" and **insert Contractor name**, hereinafter referred to as "CONTRACTOR," duly authorized to transact business in the State of Florida, with offices located at **insert Contractor address**.

ARTICLE 1. WORK

CONTRACTOR shall furnish all labor, materials, supplies, and other items required to complete the Work for **IFB#14-1226-OV, Gulf Drive at Marina Drive, Intersection Improvements, Manatee County, FL, Project No.: 6084660, FDOT Financial Project ID: 431020-1-58-01** in strict accordance with Contract Documents and any duly authorized subsequent Addenda thereto, all of which are made a part hereof.

ARTICLE 2. COMPENSATION

As compensation to CONTRACTOR, COUNTY shall pay and CONTRACTOR will accept as full consideration for the performance of all Work required by **FB#14-1226-OV, Gulf Drive at Marina Drive, Intersection Improvements, Manatee County, FL, Project No.: 6084660, FDOT Financial Project ID: 431020-1-58-01**, subject to additions and deductions as provided therein, the sum of **$insert Award amount including contingency dollars** based on a completion time of **180** calendar days.

ARTICLE 3. LIQUIDATED DAMAGES

Time is of the essence in this CONTRACT. As of the date of this CONTRACT, the damages that will be suffered by COUNTY in the event of CONTRACTOR'S failure to timely complete the Work are impossible to determine. In lieu thereof, it is agreed that if CONTRACTOR fails to achieve Final Completion of the Work within 180 calendar days of issuance of the Notice to Proceed (accounting, however, for any extensions of time

granted pursuant to approved Change Orders), CONTRACTOR shall pay to COUNTY, as liquidated damages (and not as a penalty), the sum of $758.00 per calendar day for each day beyond 180 calendar days until CONTRACTOR achieves Final Completion. COUNTY shall have the option of withholding said liquidated damages from any pay application(s) thereafter submitted by CONTRACTOR. Alternatively, CONTRACTOR shall immediately pay said sums to COUNTY upon COUNTY'S demand for same.

ARTICLE 4. ENGINEER

The COUNTY of MANATEE, Public Works Department, is responsible as COUNTY and Cardno TBE as "ENGINEER," designed this Project and is responsible for technical/engineering reviews and decisions. The ENGINEER is a member of COUNTY'S Project Management team which is collectively responsible for ensuring the Work is completed in accordance with the Contract Documents.

All communications involving this Project will be addressed to: Mr. Brent Morris, Project Engineer Ii and to the Engineer of Record, Mr. Mark Modjeski, PE, Director of Traffic Operations. All invoicing will be addressed to the attention of: Mr. Brent Morris, Project Engineer Ii with copies to Mr. Mark Modjeski, PE, Director of Traffic Operations, Cardno TBE .

Manatee County Government
Public Works Department
Attn: Mr. Brent Morris, Project Engineer Ii
IFB#14-1226-OV
1022 26th Avenue East
Bradenton, FL 34208
941-708-7450, Ext. 7338

Cardno TBE
Attn: Mr. Mark Modjeski, PE
IFB#14-1226-OV
12481 Telecom Drive
Tampa, FL 33637
813-221-0048

Where the terms ENGINEER and/or COUNTY are used in the Contract Documents, it shall mean COUNTY'S Project Management team.

ARTICLE 5. CONTRACTOR'S REPRESENTATIONS

In order to induce COUNTY to enter into this CONTRACT, CONTRACTOR makes the following representations:

5.1 CONTRACTOR has familiarized itself with the nature and extent of the Bid Documents, Work, site, locality and all local conditions and laws and regulations that in any manner may affect cost, progress, performance or furnishing of the Work.

5.2 CONTRACTOR has studied carefully all drawings of the physical conditions upon which CONTRACTOR is entitled to rely.

5.3 CONTRACTOR has obtained and carefully studied (or assumes responsibility for obtaining and carefully studying) all such examinations, investigations, explorations, tests, reports and studies which pertain to the physical conditions at or contiguous to the site or which otherwise may affect the cost, progress, performance or furnishing of the Work as CONTRACTOR considers necessary for the performance or furnishing of the Work at the Contract Price, within the Contract Time and in accordance with the other terms and conditions of the Bid Documents; and no additional examinations, investigations, explorations, tests, reports, studies or similar information or data are or will be required by CONTRACTOR for such purposes.

5.4 CONTRACTOR has reviewed and checked all information and data shown or indicated on the Bid Documents with respect to existing Underground Facilities at or contiguous to the site and assumes responsibility for the accurate location of said Underground Facilities. Any additional examinations, investigations, explorations, tests, reports, studies or similar information or data in respect of said Underground Facilities conducted by CONTRACTOR will be done at CONTRACTOR'S expense.

5.5 CONTRACTOR has correlated the results of all such observations, examinations, investigations, explorations, tests, reports and studies with the terms and conditions of the Bid.

5.6 CONTRACTOR has given COUNTY written notice of all conflicts, errors or discrepancies that have been discovered in the Bid Documents and the written resolution thereof by COUNTY is acceptable to CONTRACTOR.

5.7 CONTRACTOR shall schedule and perform the Work subject to COUNTY'S approval and shall hold COUNTY harmless from all liabilities incurred due to CONTRACTOR'S failure to coordinate with COUNTY.

ARTICLE 6. CONTRACT DOCUMENTS

The Contract Documents which comprise the entire CONTRACT between COUNTY and CONTRACTOR concerning the Work consist of the following:

6.1 This CONTRACT and Bid Document **IFB#14-1226-OV**

6.2 Invitation for Bid #14-1226-OV, in its entirety

6.3 Public Construction Bond Form and Insurance Certificate(s)

6.4 Drawings/Plans (not attached)

6.5 Addendum number insert Addendum # to insert Addendum # inclusive

6.6 CONTRACTOR'S Bid Form

6.7 Reports

6.8 The following, which may be delivered or issued after the Effective Date of the CONTRACT and are not attached hereto: all written Change Orders and other documents amending, modifying, or supplementing the Contract Documents.

6.9 The documents listed in paragraphs above are attached to this CONTRACT (except as noted otherwise above). There are no Contract Documents other than those listed above in this Article 6.

ARTICLE 7. DISPUTE RESOLUTION

Disputes shall be resolved as follows: good faith negotiations by the designated agents of the parties and if not resolved by such designated agents, CONTRACTOR shall submit its claim, with the basis for the dispute, in writing to the Manatee County Purchasing Official for a determination and handling in accordance with the provisions of Chapter 2-26 of the Manatee County Code.

ARTICLE 8. NO WAIVER

8.1 The failure of CONTRACTOR or COUNTY to insist on the strict performance of the terms and conditions hereof shall not constitute or be construed as a waiver or relinquishment of either party's right to thereafter enforce the same in accordance with this CONTRACT in the event of a continuing or subsequent default on the part of CONTRACTOR or COUNTY.

8.2 Nothing herein shall be interpreted as a waiver of COUNTY of its rights, including the limitations of the limited waiver of sovereign immunity, as set forth in Florida Statute 768.28, or any other statute, and COUNTY expressly reserves these rights to the full extent allowed by law.

ARTICLE 9. NO THIRD-PARTY BENEFICIARIES

This CONTRACT is solely for the benefit of the parties hereto, and no right, privilege, or cause of action shall by reason hereof accrue upon, to, or for the benefit of any third party. Nothing in this CONTRACT is intended or shall be construed to confer upon or give any person, corporation, partnership, trust, private entity, agency, or any other governmental entity any right, privilege, remedy, or claim under or by reason of this CONTRACT or any provisions or conditions hereof.

ARTICLE 10. GOVERNING LAW, JURISDICTION AND VENUE

10.1 This CONTRACT and the construction and enforceability thereof shall be interpreted under the laws of the State of Florida.

10.2 CONTRACTOR consents and agrees that all legal proceedings related to the subject matter of this CONTRACT shall be governed by the laws of the State of Florida.

10.3 CONTRACTOR consents and agrees that jurisdiction for such proceedings shall lie exclusively with such court, and venue shall be in the Circuit Court of the Twelfth Judicial Circuit in and for Manatee County, Florida.

10.4 In the event of any litigation arising under the terms of this CONTRACT, each party shall be responsible for their own attorney's fees, including appellate fees, regardless of the outcome of the litigation.

ARTICLE 11. FORCE MAJEURE

Neither party shall be considered in default of performance of such obligations hereunder to the extent that performance of such obligations or any of them is delayed or prevented by Force Majeure. Force Majeure shall include, but not be limited to hostility, revolution, civil commotion, strike, epidemic, fire, flood, wind, earthquake, hurricane, or other disruptive event of nature, act of terrorism, explosion, lack of or failure of transportation or bridge/roadway facilities, any law, proclamation, regulation, ordinance or other act of government, or any act of God or any cause whether of the same or different nature, existing or future; provided that the cause, whether or not enumerated in this Article, is beyond the control and without the fault or negligence of the party seeking relief under this Article.

ARTICLE 12. MISCELLANEOUS

12.1 Terms used in this CONTRACT are defined in Article 1 of Section E, General Conditions.

12.2 No assignment by a party hereto of any rights under or interest in the Contract Documents will be binding on another party hereto without the written consent of the party sought to be bound; and specifically but without limitation, monies that may become due and monies that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law); and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignee from any duty or responsibility under the Contract Documents.

12.3 COUNTY and CONTRACTOR each binds itself, its partners, successors, assigns and legal representatives to the other party hereto, its partners, successors, assigns and legal representatives in respect of all covenants, agreements, and obligations contained in the Contract Documents.

12.4 By accepting Award of this CONTRACT, CONTRACTOR, which shall include its directors, officers and employees, represents that it presently has no interest in and shall acquire no interest in any business or activity which would conflict in any manner with the performance of duties or services required hereunder.

CONTRACT

IFB #14-1226-OV

IN WITNESS WHEREOF, the parties hereto have caused this CONTRACT **IFB#14-1226-OV** to be duly executed by their authorized representatives.

CONTRACTOR

By: _____

_____
Print Name & Title of Signer

Date: _____

COUNTY OF MANATEE, FLORIDA

By: _____
Melissa M. Wendel, CPPO
Purchasing Official

Date: _____

CONTRACT DRAWINGS

GULF DRIVE AT MARINA DRIVE INTERSECTION IMPROVEMENTS

FOR

MANATEE COUNTY, FLORIDA

COUNTY PROJECT NUMBER: 6084660

FINANCIAL PROJECT ID: 431020-1-58-01

SIGNALIZATION PLANS

NTS

INDEX OF SIGNALIZATION PLANS

GOVERNING STANDARDS AND SPECIFICATIONS:

FLORIDA DEPARTMENT OF TRANSPORTATION, 2014 DESIGN STANDARDS AND REVISED INDEX DRAWINGS AS APPENDED HEREIN, AND 2014 STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, AS AMENDED BY CONTRACT DOCUMENTS.

FOR DESIGN STANDARDS CLICK ON THE "DESIGN STANDARDS" LINK AT THE FOLLOWING WEB SITE: HTTP://WWW.DOT.STATE.FL.US/RDDESIGN/

FOR THE STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION CLICK ON THE "SPECIFICATIONS" LINK AT THE FOLLOWING WEB SITE: HTTP://WWW.DOT.STATE.FL.US/SPECIFICATIONSOFFICE/

ATTENTION IS DIRECTED TO THE FACT THAT THESE PLANS MAY HAVE BEEN REDUCED IN SIZE BY REPRODUCTION. THIS MUST BE CONSIDERED WHEN OBTAINING SCALED DATA.

UTILITY WARNING NOTE

ABOVE GROUND AND / OR UNDERGROUND UTILITIES MAY BE IN THE AREA OF THIS PROJECT – PROCEED WITH CAUTION – THE CONTRACTOR SHALL CALL SUNSHINE STATE "ONE CALL" AT 811 AND THE UTILITY OWNERS IN ADVANCE OF BEGINNING WORK, IN ACCORDANCE WITH CHAPTER 556, FLORIDA STATUTES.

SUMMARY OF REVISIONS	
DATE	DESCRIPTION

SHOP DRAWINGS TO BE SUBMITTED TO:

BRENT A. MORRIS, PE
PROJECT MANAGER
MANATEE COUNTY PUBLIC WORKS
1022 26TH AVENUE EAST
BRADENTON, FLORIDA 34208
(941) 708-7450 EXT. 7338

48 HOURS BEFORE DIGGING "CALL SUNSHINE" 811

PLANS PREPARED BY:

Cardno
Florida 33637
www.cardno.com 813.621.0048
Certificate of Authorization No. 3843

MARK W. MODJESKI PE LICENSE No. 54838 STATE OF FLORIDA PROFESSIONAL ENGINEER

ENGINEER OF RECORD

MARK W. MODJESKI, PE — PE LICENSE NO. 54838

DATE 12/18/13

DATE:	5-17-2013
SCALE:	HORIZ: N/A VERT: N/A
SHEET:	T-1

TABULATION OF QUANTITIES

PAY ITEM NO.	DESCRIPTION	UNIT	SHEET NUMBERS T-5 PLAN	T-5 FINAL	PLAN	FINAL	PLAN	FINAL	PLAN	FINAL	PLAN	FINAL	PLAN	FINAL	PLAN	FINAL	PLAN	FINAL	PLAN	FINAL	PLAN	FINAL	PLAN	FINAL	TOTAL THIS SHEET PLAN	TOTAL THIS SHEET FINAL	GRAND TOTAL PLAN	GRAND TOTAL FINAL	REF. SHEET
101-1	MOBILIZATION	LS																							1		1		
102-1	MAINTENANCE OF TRAFFIC	LS																							1		1		
102-14	TRAFFIC CONTROL OFFICER	ED																							24		24		
102-60	WORK ZONE SIGN	ED																							1440		1440		
102-76	ARROW BOARD/ADVANCE WARNING ARROW PANEL	ED																							8		8		
102-104	TEMPORARY SIGNALIZATION AND MAINT OF INT	ED																							180		180		
102-107-1	TEMPORARY TRAFFIC DETECTION AND MAINTENANCE, INT	ED																							180		180		
519-78	BOLLARDS	EA	2																						2		2		
520-2-4	CONCRETE CURB (TYPE D)	LF	35																						35		35		
522-1	CONCRETE SIDEWALK (4" THICK)	SY	11																						11		11		
580-1-2	LANDSCAPE COMPLETE - LARGE PLANTS	LS	1																						1		1		
630-2-11	CONDUIT (F&I) (OPEN TRENCH)	LF	30																						30		30		
630-2-12	CONDUIT (F&I) DIRECTIONAL BORE)	LF	120																						120		120		
632-7-1	SIGNAL CABLE (F&I)(NEW OR RECONSTRUCTED INT)	PI	1																						1		1		
635-2-11	PULL AND SPLICE BOX (F&I) (17" X 30" COVER SIZE)	EA	6																						6		6		
639-1-112	POWER SERVICE (UG)(METER BASE PURCH BY CONTR)	AS	1																						1		1		
639-2-1	ELECTRICAL SERVICE WIRE (F&I)	LF	60																						60		60		
641-1	STRAIN POLE GUYING (CONCRETE)	EA	1																						1		1		
641-2-12	CONCRETE POLE (F&I) (TYPE P-II SERVICE POLE, 36')	EA	1																						1		1		
649-31-104	MAST ARM (F&I) (150 MPH) (70.5 FOOT ARM)	EA	1																						1		1		
650-1-311	TRAFFIC SIGNAL, 12" (F&I) (3 SECT, 1 WAY) (ALUM) (LED)	AS	6																						6		6		
660-4-11	VEH DETECTION SYS (F&I)(VIDEO)(CABINET EQUIPMENT)	EA	1																						1		1		
660-4-12	VEH DETECTION SYS (F&I)(VIDEO)(ABOVE GROUND EQUIP)	EA	3																						3		3		
668-35	DET CABINET (INST) (TYPE V) (54" X 38" X 24")	EA	1																						1		1		
670-5-410	TRAFFIC CONTROLLER ASSY (MODIFY) (NEMA)	AS	1																						1		1		
690-10	TRAFFIC SIGNAL HEAD ASSEMLY (REMOVAL)	EA	6																						6		6		
690-32-1	POLE REMOVAL (SHALLOW) (DIRECT BURIAL)	EA	2																						2		2		
690-60	VEHICLE DETECTOR ASSEMBLY (REMOVE)	EA	5																						5		5		
690-80	SPAN WIRE ASSEMBLY (REMOVE)	EA	1																						1		1		
690-90	CONDUIT & CABLING WITHIN INTERSECTION (REMOVE)	PI	1																						1		1		
690-100	SIGNAL EQUIPMENT MISCELLANEOUS (REMOVE)	PI	1																						1		1		
700-5-22	INTERNALLY ILLUMINATED SIGN (F&I) (12-18 SF)	EA	2																						2		2		
700-46-15	SIGN EXISTING - REMOVE (SPAN WIRE)	AS	3																						3		3		

NO.	DESCRIPTION	BY	DATE

MANATEE COUNTY

GULF DRIVE AT MARINA DRIVE INTERSECTION IMPROVEMENTS
FPID: 431020-1-58-01

Cardno TBE
12481 Telecom Drive, Tampa, FL 33637
www.cardnotbe.com - 813.221.0048
Certificate of Authorization No. 3843

MARK W. MODJESKI LICENSE No. 54838 STATE OF FLORIDA PROFESSIONAL ENGINEER

Mark Modjeski, PE
LIC. NO: 54838
DATE

DESIGNED	MWM
DRAWN	HBH
C.O.C.	DJA
APPROVED	

TABULATION OF QUANTITIES

PROJECT NO:	00193-008-021
DATE:	12-12-2013
SHEET NO:	T-2

FILE: J:\JOB\0193\00193-008-21\ACAD\dwg\TABQSEQ01.dwg LAST SAVED: Wed, 12/18/13-4:08p PLOTTED: Wed, 12/18/13-4:48p BY: David.Allen

GENERAL NOTES:

1. AT LEAST TWO (2) FULL BUSINESS DAYS PRIOR TO BEGINNING THE INSTALLATION, THE CONTRACTOR SHALL CONTACT THE ENGINEER AND THE TRAFFIC SIGNAL INSPECTOR/LIAISON:
   MR. CARLOS CABRERA PH: 941-359-7317
   FLORIDA DEPARTMENT OF TRANSPORTATION
   SARASOTA OPERATIONS CENTER
   1840 61ST STREET
   SARASOTA, FLORIDA 34243

2. AT LEAST FIVE (5) WORKING DAYS PRIOR TO BEGINNING CONSTRUCTION, THE CONTRACTOR SHALL CONTACT THE ENGINEER IN CONJUNCTION WITH THE MANATEE COUNTY PUBLIC WORKS DEPARTMENT, PROJECT MANAGEMENT DIVISION, MS. EYRA CASH, PE, PROJECT MANAGER (941) 708-7450 EXT. 7344, MANATEE COUNTY TRAFFIC OPERATIONS DIVISION.

3. THE MAINTAINING AGENCY IS:

   MANATEE COUNTY
   TRAFFIC OPERATIONS DIVISION
   2904 12TH STREET COURT EAST
   BRADENTON, FLORIDA 34208

4. THE CONTRACTOR SHALL NOTIFY THE ENGINEER, IN CONJUNCTION WITH THE TRAFFIC ENGINEERING DIVISION (MR. VISHAL S. KAKKAD, (941) 749-3502 AT LEAST TWO (2) BUSINESS DAYS IN ADVANCE TO SCHEDULE THE FINAL INSPECTION. SIGNAL PROJECT ACCEPTANCE INSPECTIONS SHALL BE COORDINATED WITH THE COUNTY TRAFFIC ENGINEER AND THE F.D.O.T. TRAFFIC SIGNAL INSPECTOR/LIAISON WITH A MINIMUM OF TWO FULL BUSINESS DAYS NOTICE. UPON PASSING FINAL INSPECTION THE CONTRACTOR SHALL SEND A WRITTEN REQUEST TO THE ENGINEER, IN CONJUNCTION WITH THE MANATEE COUNTY TRAFFIC OPERATIONS DIVISION (ATTN: MR. AARON BURKETT) REQUESTING TO TRANSFER MAINTENANCE FROM THE CONTRACTOR TO MANATEE COUNTY. MANATEE COUNTY WILL RESPOND WITHIN FIVE WORKING DAYS TO ESTABLISH A TIME TABLE FOR THE TRANSFER OF MAINTENANCE RESPONSIBILITY.

5. DELIVER THREE HARD-COPY SETS OF AS-BUILT RECORD DRAWINGS, TWO SETS OF IMSA INSPECTION FORMS, AND ONE COMPACT DISK OF RECORD DRAWINGS IN ADOBE ACROBAT (PDF) AND AUTOCAD (DWG) FORMAT TO THE MANATEE COUNTY TRAFFIC ENGINEERING DIVISION (ATTN: MR. VISHAL S. KAKKAD, P.E., PTOE) AT 2101 47TH TERRACE EAST, BRADENTON, FL 34203. RECORD DRAWINGS AND INSPECTION FORMS MUST BE DELIVERED TO THE COUNTY AT LEAST TWO (2) BUSINESS DAYS PRIOR TO SCHEDULING THE FINAL INSPECTION.

6. THE CONTRACTOR SHALL HAVE AN IMSA CERTIFIED LEVEL II (ELECTRONICS OR ELECTRICAL TECHNICIAN) ON THE JOB SITE AT ALL TIMES WHILE WORK IS BEING PERFORMED. ALL SIGNAL TECHNICIANS SHALL HAVE A MINIMUM IMSA LEVEL I CERTIFICATION. CERTIFICATION OF ALL TECHNICIANS SHALL BE PROVIDED TO THE COUNTY PRIOR TO BEGINNING WORK.

7. UPON PROJECT COMMENCEMENT, THE SIGNAL CONTRACTOR SHALL PROVIDE CONTACT NUMBERS TO THE MANATEE COUNTY TRAFFIC OPERATIONS DIVISION.

8. PRIOR TO ORDERING MATERIALS, THE SIGNAL CONTRACTOR SHALL CONTACT THE TRAFFIC OPERATIONS DIVISION TO VERIFY CURRENT COLOR CODES FOR SIGNAL CABLE AND TO VERIFY THAT ALL EQUIPMENT TO BE ORDERED COMPLIES WITH MANATEE COUNTY EQUIPMENT AND DESIGN REQUIREMENTS.

9. PRIOR TO ORDERING ANY EQUIPMENT, SUBMIT STRUCTURAL AND SHOP DRAWINGS OF ALL EQUIPMENT TO THE ENGINEER, IN CONJUNCTION WITH THE MANATEE COUNTY TRAFFIC ENGINEERING DIVISION FOR REVIEW AND APPROVAL.

10. SUBMIT COMPRESSIVE STRENGTH TEST RESULTS FOR MAST ARM POLE FOUNDATIONS TO THE TRAFFIC ENGINEERING DIVISION FOR REVIEW AND APPROVAL.

11. EXTREME CARE SHALL BE TAKEN TO ENSURE THAT ALL CONSTRUCTION ELEMENTS ARE INSTALLED AS SHOWN IN THE PLANS WITHIN EXISTING RIGHT-OF-WAY.

12. THE CONTRACTOR SHALL WORK IN CONJUNCTION WITH THE MAINTAINING AGENCY TO COORDINATE UTILITY RELOCATION IF NECESSARY.

13. IN THE EVENT RIGHT OF WAY OR IRRESOLVABLE UTILITY CONFLICTS PROHIBIT PLACEMENT ACCORDING TO THE PLANS, THE CONTRACTOR SHALL CONTACT THE ENGINEER, IN CONJUNCTION WITH THE TRAFFIC OPERATIONS ENGINEER AND/OR ENGINEER OF RECORD (EOR) TO OBTAIN A DESIGN VARIATION.

14. WORK ZONE TRAFFIC CONTROL:
   A. MAINTAIN TRAFFIC CONTROL AS PER INDEXES IN THE F.D.O.T. ROADWAY TRAFFIC DESIGN STANDARDS, INDEX 600 SERIES, DATED JANUARY 2013.
   B. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ENSURING SAFE AND EFFICIENT OPERATION DURING CONSTRUCTION ACTIVITIES.

15. THE LOCATION OF UTILITIES SHOWN ON THE PLANS ARE BASED ON LIMITED INVESTIGATION TECHNIQUES AND SHOULD BE CONSIDERED APPROXIMATE ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATIONS OF ALL UTILITIES. EXISTING UTILITIES ARE TO REMAIN IN PLACE UNLESS OTHERWISE NOTED.

16. THE CONTRACTOR SHALL NOTIFY UTILITY OWNERS OF ANY EXCAVATION OR DEMOLITION ACTIVITY THROUGH SUNSHINE ONE CALL OF FLORIDA INC. (811) AND SHALL ALSO NOTIFY THOSE UTILITY OWNERS/AGENCIES LISTED WITHIN OR IMPACTED BY THESE PLANS, NOT LESS THAN TWO (2) FULL BUSINESS DAYS IN ADVANCE OF BEGINNING CONSTRUCTION ON THE JOB SITE.

17. THE CONTRACTOR SHALL HAND DIG THE FIRST 48 INCHES (4 FEET) OF THE HOLE FOR THE MAST ARM FOUNDATION.

18. IT SHOULD BE NOTED THAT NO TEST BORINGS WERE MADE WHERE CONDUIT RUNS ARE TO BE INSTALLED BY DIRECTIONAL BORING.

19. WHEN A CONTRACTOR IS PERFORMING CONSTRUCTION ACTIVITIES WHERE A LANE IS CLOSED, THE ENGINEER MAY REQUIRE AN OFF DUTY LAW ENFORCEMENT OFFICER TO DIRECT TRAFFIC. THE HOURLY RATE OF PAY FOR AN OFF DUTY LAW ENFORCEMENT OFFICER CAN BE OBTAINED FROM THE LOCAL LAW ENFORCEMENT OFFICE. THE COST OF THE OFFICER SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AND INCLUDED IN PAY ITEM 102-1, MOT.

20. UNLESS OTHERWISE NOTED, ALL REMOVED EQUIPMENT EXCEPT POLES SHALL BE TURNED OVER TO MANATEE COUNTY AND DELIVERED TO:

   MANATEE COUNTY TRAFFIC OPERATIONS DIVISION
   2904 12TH STREET COURT EAST
   BRADENTON, FLORIDA 34208

21. CONCRETE POLES SHALL BE PROPERLY DISPOSED OF BY THE CONTRACTOR AT THE CONTRACTOR'S EXPENSE.

22. THE CONTRACTOR SHALL CONTACT THE LOCAL POWER COMPANY FOR ASSISTANCE IN PERFORMING ALL NECESSARY WORK UNDER POWER LINES AT SIGNAL POLES SUCH AS THE INSTALLATION OF SIGNAL CABLE, FIBERGLASS INSULATORS, AND SIGNAL POLES. AT LOCATIONS WHERE THE REQUIRED VERTICAL CLEARANCE TO THE POWER LINES CANNOT BE MAINTAINED, A QUALIFIED REPRESENTATIVE FROM THE POWER COMPANY SHALL BE PRESENT DURING ALL WORK UNDER POWER LINES. ANY COST ASSOCIATED WITH THIS SHALL BE INCLUDED IN THE RELATED PAY ITEMS.

23. ALL FPL OVERHEAD ELECTRICAL FACILITIES ARE TO REMAIN ENERGIZED AND IN PLACE. "TABLE A" MINIMUM CLEARANCE DISTANCES SPECIFIED IN SUBPART CC OF OSHA RULE 29 PART 1926 (AS THEY PERTAIN TO CRANE/DERRICK OPERATIONS), AND/OR THOSE MINIMUM DISTANCES SPECIFIED IN 29 CFR 1910.333(C)(3) FOR WORK IN PROXIMITY TO POWER LINES NOT COVERED BY THIS SUBPART CC, MUST BE MAINTAINED.

24. GROUNDING: ALL GROUND ROD EQUIPMENT SHALL BE BONDED TOGETHER TO FORM AN INTEGRATED GROUNDING SYSTEM USING #6 AWG THHN COPPER WIRE. THE UPPER END OF ALL GROUND RODS SHALL BE 18 INCHES BELOW GROUND ELEVATION. MARK GROUND ROD LOCATIONS WITH PERMANENT MARKER SUCH AS AN EPOXY STICKER LOCATED ON THE NEAREST CURB AND PROVIDE AS-BUILT DRAWINGS WITH THE LOCATION OF GROUND RODS MARKED. GROUNDING CONDUCTOR MUST BE #6 OR LARGER INSULATED COPPER. EQUIPMENT SHALL NOT BE PLACED INTO OPERATIONAL SERVICE UNTIL THE ASSOCIATED GROUNDING SYSTEM HAS BEEN INSPECTED, TESTED, AND APPROVED BY A MEMBER OF THE MANATEE COUNTY TRAFFIC OPERATIONS STAFF.

UTILITY OWNERS:

TOM WRIGHT
BRIGHT HOUSE NETWORKS - MANATEE
5413 SR 64 EAST
BRADENTON, FL 34208
941-345-1348 Ext: 21348

TRACY STERN
FLORIDA POWER & LIGHT
2900 CATHERINE ST
PALATKA, FL 32177
800-868-9554

DAVID WYNNS
VERIZON FLORIDA INC
1909 US HWY. 301 N
TAMPA, FL 33619
813-627-8343

KATHY MCMAHON
MANATEE COUNTY UTILITY RECORDS MANAGEMENT
4520 66TH ST W
BRADENTON, FL 34210
941-792-8811 Ext: 5002

TEMPORARY TRAFFIC CONTROL NOTES:

1. THE CONTRACTOR SHALL NOTIFY THE ENGINEER A MINIMUM OF 48 HOURS IN ADVANCE OF ANY REQUESTED LANE CLOSURE. UPON APPROVAL OF THE LANE CLOSURE, THE CONTRACTOR WILL IMMEDIATELY NOTIFY THE LOCAL LAW ENFORCEMENT, EMERGENCY MEDICAL SERVICE, AND FIRE DEPARTMENT OF THE LANE CLOSURE.

2. THE CONTRACTOR SHALL MAINTAIN PEDESTRIAN TRAFFIC AT ALL TIMES DURING THE CONSTRUCTION PROCESS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ENSURING THAT A SAFE AND UNOBSTRUCTED ROUTE EXISTS FOR PEDESTRIANS. REFER TO STANDARD INDEX 660.

3. THE CONTRACTOR SHALL NOT EXCAVATE ANY AREAS THAT CANNOT BE SAFELY REOPENED TO TRAFFIC WITHIN THE SAME WORK PERIOD.

4. ALL TRAFFIC CONTROL DEVICES WILL BE INSTALLED PRIOR TO COMMENCEMENT OF CONSTRUCTION AND PROPERLY MAINTAINED AND OPERATED THROUGHOUT THE PERIOD OF EACH PHASE / STAGE CONSTRUCTION. ALL TEMPORARY SIGNS, PAVEMENT MARKINGS, WARNING DEVICES, WARNING LIGHTS, ETC. NECESSARY FOR THE MAINTENANCE OF TRAFFIC SHALL CONFORM TO INDEX 600 AND THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (LATEST EDITION).

5. EXISTING SPEED LIMITS SHALL BE MAINTAINED DURING CONSTRUCTION.

6. ALL LANE CLOSURES SHALL CONFORM TO THE REQUIREMENTS OF THE PLANS AND STANDARD INDEX 600 SERIES AS APPLICABLE.

7. PAY ITEM NO. 102-1, MAINTENANCE OF TRAFFIC, LUMP SUM INCLUDES BUT IS NOT LIMITED TO THE FOLLOWING ITEMS: MAINTAINING/RELOCATION OF EXISTING SIGNS.

8. THE CONTRACTOR SHALL PROVIDE A DEDICATED CREW FOR THE INSTALLATION, MAINTENANCE, AND REMOVAL OF TRAFFIC CONTROL DEVICES (I.E., WARNING DEVICES, SIGNS, ARROW PANELS, ETC.). THIS CREW SHALL CONSIST OF THE CONTRACTOR'S WORK FORCE WHOSE SOLE RESPONSIBILITY WILL BE THE MAINTENANCE OF TRAFFIC CONTROL. THE CONTRACTOR SHALL FURNISH A WORK VEHICLE TO AID IN MAINTAINING THE CONTROL DEVICES.

9. WHENEVER CONSTRUCTION EQUIPMENT IS BEING DRIVEN OR TRANSPORTED ON THE OPEN TRAVEL LANES, THE CONTRACTOR SHALL UTILIZE INDEX NO. 619.

10. THE CONTRACTOR SHALL MAINTAIN PROPER DRAINAGE FOR ALL PHASES OF CONSTRUCTION. ALL COSTS SHALL BE INCLUDED IN PAY ITEM NO. 102-1 MAINTENANCE OF TRAFFIC, LUMP SUM.

11. NO LANE CLOSURES WILL BE ALLOWED BETWEEN 6:00 A.M. AND 9:00 P.M.

12. LANE CLOSURES OR DETOURS WILL NOT BE PERFORMED DURING HOLIDAY PERIODS AS IDENTIFIED IN SPECIFICATION 8-6.4, INCLUDING THE WEDNESDAY PRIOR TO THANKSGIVING DAY. IN ADDITION TO THESE AND PREVIOUSLY SPECIFIED LIMITATIONS ON LANE CLOSURES AND DETOURS, THE FDOT AND/OR MANATEE COUNTY MAY DIRECT DAYS WHEN NO LANE CLOSURES OR DETOURS WILL BE PERMITTED. THE CONTRACTOR WILL BE PROVIDED NO LESS THAN 14 DAYS NOTICE OF THESE EVENTS AND THEY SHALL BE AT NO ADDITIONAL COSTS OR TIME TO THE COUNTY.

13. THE CONTRACTOR SHALL, AT THE DISCRETION OF THE ENGINEER, OPEN ANY TEMPORARY LANE CLOSURE CAUSING EXTENDED TRAFFIC CONGESTION (5 MINUTE DELAY) UNTIL TRAFFIC HAS RETURNED TO AN ACCEPTABLE FLOW AS DETERMINED BY THE ENGINEER.

14. THE CONTRACTOR SHALL NOT CLOSE ANY TWO CONSECUTIVE SIDE STREETS OR MEDIAN OPENINGS IN ANY GIVEN PHASE.

15. THE CONTRACTOR IS TO MAINTAIN AND KEEP STREET NAME SIGNS VISIBLE DURING CONSTRUCTION OPERATIONS. IN ORDER TO FACILITATE EMERGENCY VEHICLE TRAFFIC. COST FOR THIS WORK WILL BE INCLUDED UNDER MAINTENANCE OF TRAFFIC, LUMP SUM, PAY ITEM NO. 102-1.

NO.	DESCRIPTION	BY	DATE

MANATEE COUNTY

GULF DRIVE AT MARINA DRIVE INTERSECTION IMPROVEMENTS
FPID: 431020-1-58-01

Cardno TBE
12481 Telecom Drive, Tampa, FL 33637
www.cardnotbe.com - 813.221.0048
Certificate of Authorization No. 3843

MARK W. MODJESKI LICENSE No. 54838 STATE OF FLORIDA PROFESSIONAL ENGINEER

12/19/13

MARK W. MODJESKI, PE
LIC. NO.: 54838 DATE:

DESIGNED	MWM
DRAWN	HBH
CHK	DJA
APPROVED	

GENERAL AND TEMPORARY TRAFFIC CONTROL NOTES

PROJECT NO:	00193-008-021
DATE:	12-12-2013
SHEET NO:	T-3

FILE: J:\JOB\0193\00193-008-21\ACAD\dwg\GNTS.dwg LAST SAVED: Thu, 12/12/13-4:53p PLOTTED: Wed, 12/18/13-4:19p BY: David.Allen

PAY ITEM NOTES

1. 102-104, 102-107-1:
THE CONTRACTOR SHALL MAINTAIN VEHICLE DETECTION ON ALL APPROACHES THROUGHOUT CONSTRUCTION. UPON PROJECT COMMENCEMENT THE CONTRACTOR SHALL BE AVAILABLE TO RESPOND TO ALL SIGNAL RELATED MALFUNCTIONS AND POWER OUTAGES. THE CONTRACTOR SHALL MAINTAIN AN ADEQUATE REPAIR EQUIPMENT INVENTORY TO CORRECT MALFUNCTIONS AND TIMING ISSUES FOR THE PROJECT DURATION. THE CONTRACTOR SHALL PROVIDE A QUALIFIED SIGNAL TECHNICIAN WHO CAN RESPOND WITHIN A MAXIMUM OF TWO HOURS, WITH AVAILABILITY 24 HOURS PER DAY, 7 DAYS PER WEEK. FAILURE TO MEET THE TIME REQUIREMENTS SHALL GIVE THE ENGINEER, IN CONJUNCTION WITH THE COUNTY, AT ITS DISCRETION, THE RIGHT TO REQUEST ASSISTANCE FROM THE MANATEE COUNTY SHERIFF'S DEPARTMENT TO CONTROL TRAFFIC UNTIL THE CONTRACTOR RESPONDS AND MAKES THE NEEDED REPAIRS. THE COST FOR THE MANATEE COUNTY SHERIFF'S DEPARTMENT SHALL BE THE CONTRACTOR'S RESPONSIBILITY.

2. 519-78:
BOLLARDS SHALL BE CONSTRUCTED OF 6 INCH DIAMETER BY 60 INCH LONG SCHEDULE 80 HOT DIP GALVANIZED PIPE. EACH BOLLARD PIPE SHALL BE FILLED WITH CLASS I, 2500 PSI CONCRETE AND HAVE AN 18 INCH DIAMETER BY 24 INCH DEEP CONCRETE FOUNDATION. ALL EXPOSED SURFACES SHALL BE PAINTED WITH REFLECTORIZED YELLOW PAINT. PROVIDE CUT SHEETS FOR ALL MATERIALS TO THE ENGINEER, IN CONJUNCTION WITH MANATEE COUNTY, FOR REVIEW AND APPROVAL PRIOR TO ORDERING.

3. 520-2-4:
INCLUDES THE COST OF YELLOW REFLECTIVE PAINT ON EXPOSED SURFACE.

4. 580-1-2:
SHALL INCLUDE THE COST TO FURNISH AND INSTALL EIGHT, SEVEN GALLON MINI-VARIEGATED SHEFFLERA SHRUBS AND 11 CUBIC YARDS OF RED LAVA ROCK. THE EXISTING PALM SHALL REMAIN. THIS PAY ITEM SHALL INCLUDE THE COST TO REMOVE AND DISPOSE OF THE EXISTING SHRUBS AND LAVA ROCK.

5. 630-2-11:
USE A MINIMUM 3 INCH DIAMETER SCHEDULE 40 PVC CONDUIT FOR ALL SIGNAL AND DETECTION FUNCTIONS.

6. 630-2-12:
USE A MINIMUM 3 INCH DIAMETER HDPE TYPE SDR 11 CONDUIT FOR ALL SIGNAL AND DETECTION FUNCTIONS.

7. 632-7-1:
THE CONTRACTOR SHALL VERIFY THE SIGNAL CABLE COLOR CODE WITH MANATEE COUNTY PRIOR TO ORDERING. ALL WIRING SHALL ADHERE TO MANATEE COUNTY SPECIFICATIONS. USE A MINIMUM OF 7 CONDUCTOR SIGNAL CABLE FOR SIGNAL HEADS.

8. 635-2-11:
USE POLYMER CONCRETE CONSTRUCTION PULL BOXES WITH POLYMER CONCRETE COVERS. PULL BOXES ARE TO BE PLACED BEHIND CURB AND GUTTER. IF THERE IS NO CURB AND GUTTER, PULL BOXES SHALL BE PLACED A MINIMUM OF 7 FEET FROM EDGE OF THE PAVEMENT. THE TOP OF THE LID SHALL HAVE THE FOLLOWING IDENTIFICATION PERMANENTLY CAST INTO THE TOP SURFACE IN STAMPED RAISED LETTERS: "MANATEE COUNTY TRAFFIC SIGNAL" FOR SIGNALIZED INTERSECTION APPLICATIONS. STANDARD PULL BOX DIMENSIONS SHALL BE 17 INCHES X 30 INCHES X 12 INCHES.

9. 639-1-112:
THE BREAKERS SHALL BE CLEARLY LABELED. THE ELECTRICAL SERVICE DISCONNECT SHALL BE 100 AMP, COMPRISED OF A SIX (6) CIRCUIT DISCONNECT BOX WITH THREE CIRCUIT BREAKERS - ONE 40 AMP/120 VOLT FOR CONTROLLER CABINET, ONE 15 AMP/120 VOLT FOR INTERNALLY ILLUMINATED STREET NAME SIGNS, AND ONE 15 AMP/120 VOLT FOR FOR FUTURE USE. USE ALUMINUM RIGID ABOVE GROUND CONDUIT FOR ELECTRICAL POWER SERVICE.

THIS PAY ITEM INCLUDES A PHOTOELECTRIC CELL FOR CONTROL OF THE INTERNALLY ILLUMINATED SIGNS. INSTALL THE PHOTOELECTRIC CELL 8 FEET ABOVE GRADE ON THE SERVICE POLE. THE SIGN CONTROL CIRCUIT CONDUCTORS SHALL NOT ENTER THE TRAFFIC SIGNAL CABINET.

10. 639-2-1:
PAYMENT SHALL BE BASED ON THE LINEAR FOOT OF A SINGLE CONDUCTOR. INSTALL A BONDING WIRE FROM UTILITY COMPANY SERVICE POINT TO CONTROLLER CABINET.

11. 649-31-104:
USE THREE 2 INCH AND ONE 3/4 INCH CONDUITS STUBBED OUT THROUGH THE MAST ARM POLE FOUNDATION AND PROVIDE TEMPORARY SEAL. ALL 2 INCH CONDUITS SHALL BE TERMINATED IN A PULL BOX.

THE CONTRACTOR SHALL EMPLOY A PROFESSIONAL SURVEYOR REGISTERED IN THE STATE OF FLORIDA TO PROVIDE LAYOUT FOR THE EASEMENT. COST IS INCLUDED IN THIS PAY ITEM.

INSTALLATION OF THE DRILLED SHAFT SHALL BE PERFORMED BETWEEN THE HOURS OF 9:00 PM AND 6:00 AM. THIS INCLUDES EXCAVATION, PLACEMENT OF CONCRETE, AND REMOVAL OF SHAFT SPOILS. ALL SHAFT SPOILS SHALL BE HAULED AWAY FROM THE SITE WITHIN THE SAME WORK PERIOD AS REMOVAL.

12. 650-1-311:
USE SIGNAL HEAD SUPPORTING TUBE THAT IS CAPABLE OF ADJUSTING VERTICALLY A MINIMUM OF 18 INCHES. DO NOT USE PLASTIC GARBAGE BAGS AS A COVERING FOR CONCEALING SIGNAL HEADS. THIS PAY ITEM INCLUDES THE COST OF TUNNEL VISORS AND BACK PLATES. USE LOUVERED ALUMINUM SIGNAL HEAD BACK PLATES WITH A 2 INCH YELLOW REFLECTORIZED (TYPE III REFLECTIVITY) OUTER EDGE BORDER.

13. 660-4-11, 660-4-112:
INSTALL SYSTEM IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. USE A 72 INCH LONG GUSSET TUBE FOR VIDEO DETECTION CAMERA ATTACHMENT BRACKET. VIDEO DETECTION SHALL BE COMPATIBLE WITH MANATEE COUNTY'S EXISTING VIDEO DETECTION SYSTEM. THE CAMERA SHALL BE ITERIS VANTAGE RZ4 ADVANCED WIDE DYNAMIC RANGE COLOR CAMERA MOUNTED ON A PELCO MAST ARM CAMERA BRACKET. IN ADDITION TO THE CAMERAS AND OTHER RELATED EQUIPMENT, THE VIDEO DETECTION SYSTEM SHALL INCLUDE THE FOLLOWING: ITERIS VANTAGE EDGE 2 PROCESSOR, ITERIS EDGE CONNECT MODULE, ITERIS VANTAGE EDGE 2 TS2 I/O MODULE. SEE PLAN SHEET T-5 FOR NUMBER OF VIDEO CAMERAS INCLUDED IN THE VIDEO DETECTION ASSEMBLY. THE CONTRACTOR SHALL LEAVE A MINIMUM OF 30 INCHES OF SPARE CABLE AT EACH CAMERA BRACKET. THE SLACK SHALL BE NEATLY FORMED INTO A LOOP AND SECURED TO THE CAMERA. A MINIMUM OF 10 FEET OF VIDEO CABLE SLACK SHALL BE NEATLY STORED AT EACH PULL BOX LOCATION. A MINIMUM OF 30 FEET OF SLACK SHALL BE AVAILABLE FOR EACH VIDEO DETECTION CABLE RUN.

14. 668-35:
THE EMERGENCY GENERATOR CABINET (EGC) FOUNDATION SHALL HAVE DIMENSIONS OF 48" X 36" FOR CABINET MOUNTING WITH A FDOT STANDARD TECHNICIAN PAD OR STEPS. IT SHALL BE LOCATED ADJACENT TO THE EXISTING SIDEWALK WITH (2) - 2 INCH CONDUITS AND (1) - 1/2 INCH CONDUIT INSTALLED DIRECTLY TO THE CONTROLLER BASE. MANATEE COUNTY WILL FURNISH THE GENERATOR CABINET TO THE CONTRACTOR. THE CONTRACTOR SHALL COORDINATE WITH MANATEE COUNTY TO PICK UP, TRANSPORT, AND INSTALL THE GENERATOR CABINET ON THE PROPOSED FOUNDATION.

ALL COSTS OF LABOR, CONCRETE AND OTHER MATERIALS FOR THE EGC BASE, TECHNICIAN PAD, STEPS AS REQUIRED, AND INSTALLATION OF THE GENERATOR CABINET ARE INCLUDED IN THIS ITEM. THE EGC BASE SHALL BE AT LEAST 24 INCHES HIGH OR THE SAME ELEVATION AS THE CROWN OF THE ROADWAY, WHICHEVER IS GREATER. THE MAXIMUM DISTANCE FROM THE TECHNICIAN PAD OR STEP TO THE FOUNDATION TOP IS 24 INCHES. THE CABINET DOORS SHALL OPEN TOWARD OR PARALLEL TO THE RIGHT-OF-WAY LINE AND AWAY FROM TRAFFIC.

15. 670-5-410:
THIS ITEM SHALL INCLUDE THE COST OF CABINET MODIFICATIONS NECESSARY TO ACCOMMODATE THE PROPOSED VIDEO DETECTION SYSTEM AND CORE DRILLING OF THE EXISTING CONTROLLER FOUNDATION.

THE EXISTING CONTROLLER AND UPS CABINETS SHALL REMAIN IN PLACE. THIS LOCATION HOUSES COMPONENTS FOR THE MANATEE COUNTY ATMS SYSTEM (DEDICATED TELEPHONE DROP, MODEM, AND TWISTED PAIR COPPER CABLE TO MANATEE AVE). THE CONTRACTOR SHALL TAKE DUE CARE DURING CONSTRUCTION NOT TO DISRUPT ATMS COMMUNICATIONS. IF CONTRACTOR ACTIVITIES WILL AFFECT ATMS COMMUNICATIONS MANATEE COUNTY TRAFFIC ENGINEERING SHALL BE CONTACTED 24 HOURS IN ADVANCE OF THE ACTIVITY.

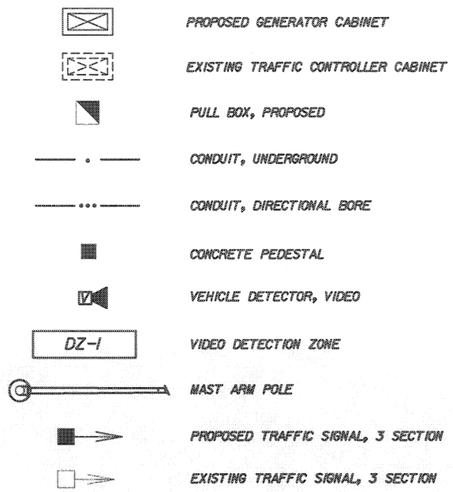
THE CONTRACTOR SHALL DETERMINE THE NUMBER OF CONDUITS NEEDED FOR THE PROPOSED SIGNALIZATION UPGRADES AND CORE DRILL THE EXISTING BASE ACCORDINGLY. IF CORE DRILLING IS PERFORMED, THE CONTRACTOR SHALL INSTALL 2 INCH CONDUITS FOR THE UPGRADES AND ONE ADDITIONAL 2 INCH SPARE CONDUIT INTO A NEW SPARE PULL BOX.

16. 690-32-1:
INCLUDES THE COST OF BACKFILL AND RESTORATION. THE EXISTING POLE FOUNDATION ON THE NORTH EAST CORNER SHALL BE REMOVED TO 4 FEET DEPTH; THE POLE FOUNDATION ON THE SOUTH WEST CORNER SHALL BE REMOVED TO 1 FOOT DEPTH.

17. 700-5-22:
USE LED INTERNALLY ILLUMINATED STREET NAME SIGNS. ALL INTERNALLY ILLUMINATED STREET NAME SIGNS SHALL BE RIGIDLY MOUNTED TO POLE BRACKETS ATTACHED TO MAST ARM UPRIGHT.

CONDUIT LEGEND
LV = SIGNAL LOW VOLTAGE CONDUIT (INCLUDES VID CABLE)
HV = SIGNAL HIGH VOLTAGE CONDUIT
SP = SPARE CONDUIT

SYMBOL LEGEND



NO.	DESCRIPTION	BY	DATE

MANATEE COUNTY

GULF DRIVE AT MARINA DRIVE INTERSECTION IMPROVEMENTS
FPID: 431020-1-58-01

Cardno TBE
12461 Telecom Drive, Tampa, FL 33637
www.cardnotbe.com - 813.221.9048
Certificate of Authorization No. 3843

MARK W. MODJESKI LICENSE No. 54838 STATE OF FLORIDA PROFESSIONAL ENGINEER

Mark W. Modjeski 12/19/13

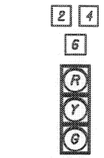
MARK W. MODJESKI
LIC. NO: 54838 DATE

DESIGNED	MWM
DRAWN	HBH
QC	DJA
APPROVED	

PAY ITEM NOTES

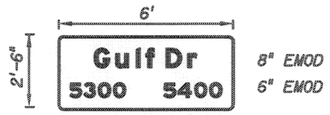
PROJECT NO:	00193-008-021
DATE:	12-12-2013
SHEET NO:	T-4

FILE: J:\JOB\0193\00193-008-21\ACAD\dwg\PI_NOTES.dwg LAST SAVED: Wed, 12/18/13-3:38p PLOTTED: Wed, 12/18/13-4:19p BY: David.Allen

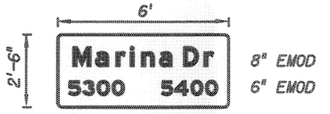


3-SECT., 1-WAY
650-1-311 6 AS

USE LOUVERED ALUMINUM SIGNAL HEAD BACK PLATES WITH A 2 INCH REFLECTORIZED (TYPE III REFLECTIVITY) OUTER EDGE BORDER.



Ⓐ
SINGLE FACE
700-5-22 1 EA



Ⓑ

Ⓒ
DOUBLE FACE
700-5-22 1 EA

SIGN PANELS B AND C SHALL BE COMBINED FOR ONE DOUBLE FACE SIGN ASSEMBLY.

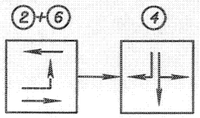
CONTROLLER NOTES:

MAJOR STREET IS GULF DRIVE (MOVEMENTS 2 AND 6).
MINOR STREET IS MARINA DRIVE (MOVEMENT 4).

THE CONTROLLER CABINET SHALL BE WIRED FOR SOP 1. THE EXISTING CONTROLLER OPERATION SHALL REMAIN.

FLASHING OPERATION IS YELLOW FOR MOVEMENTS 2 AND 6 AND RED FOR MOVEMENT 4.

EACH PHASE/ MOVEMENT SHALL BE WIRED FROM THE SIGNAL DISPLAY TO THE CONTROLLER AS A SEPARATE PHASE/ MOVEMENT.



EXISTING OPERATION

CONTROLLER TIMINGS								
TIMING FUNCTION								
MOVEMENT NUMBER		2		4				
TIMING FUNCTION	MINIMUM GREEN	20		14				
	EXTENSION	3.0		6.0				
	MAXIMUM GREEN 1	30		50				
	MAXIMUM GREEN 2							
	YELLOW CLEARANCE	3.6		3.0				
	ALL RED	2.0		2.0				
	PEDESTRIAN WALK							
	PED. CLEARANCE							
	RECALL	MIN						

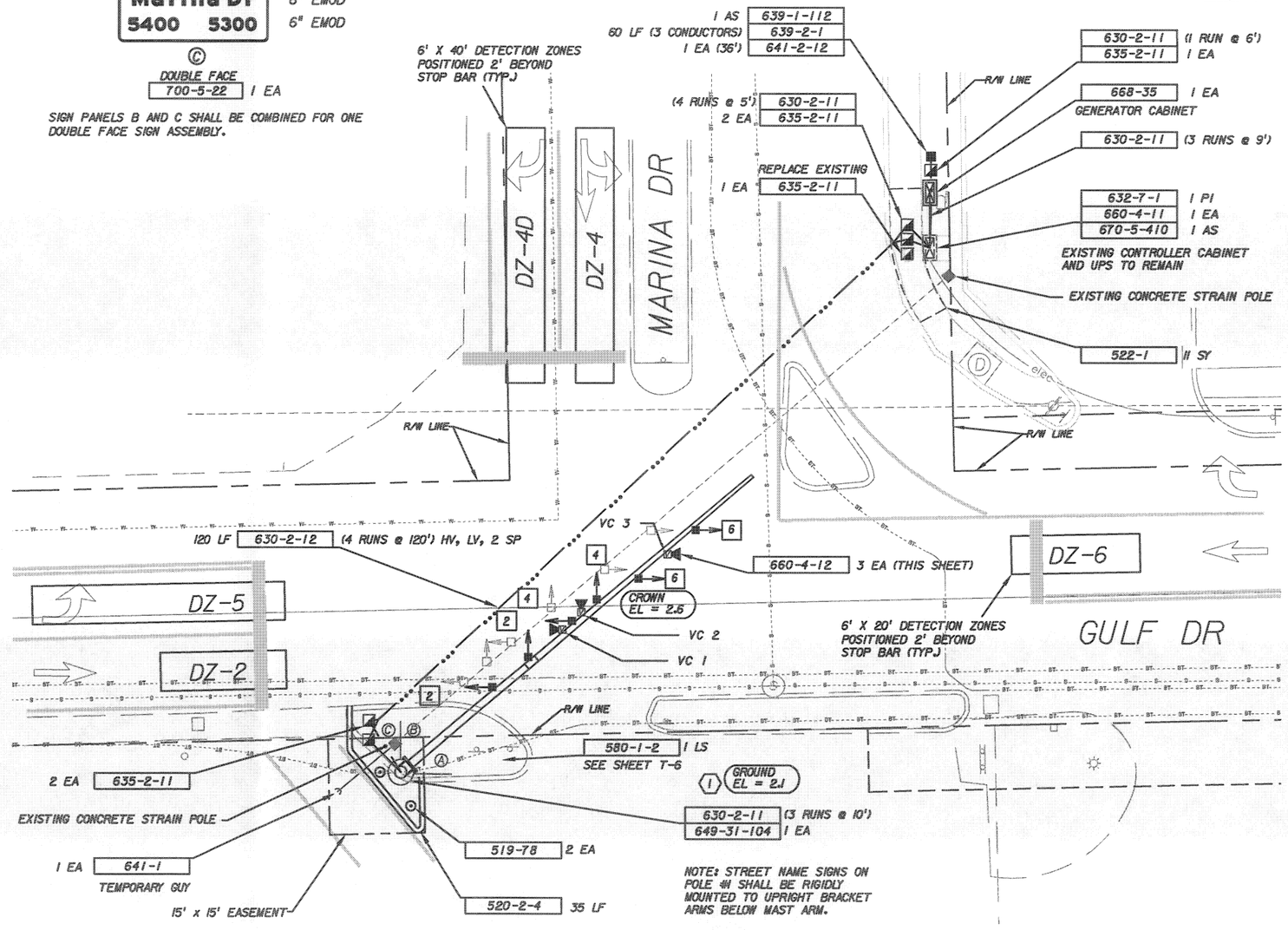
TIMINGS ARE INITIAL AND MAY REQUIRE FIELD ADJUSTING AS DIRECTED BY PROJECT ENGINEER.

VIDEO DETECTOR ZONES			
ZONE LOCATION NO.	VIDEO CAMERA NO.	NO. OF DETECTION ZONES	DELAY TIME (SEC)
DZ-2	1	1	0
DZ-4	2	1	0
DZ-4D	2	1	8
DZ-5	2	1	0
DZ-6	3	1	0

DELAY TIME IS INITIAL AND MAY REQUIRE FIELD ADJUSTING AS DIRECTED BY PROJECT ENGINEER.

REMOVAL ITEMS:

690-10	6 EA
690-32-1	2 EA
690-60	5 EA
690-80	1 EA
690-90	1 PI
690-100	1 PI
700-46-15	3 AS



NO.	DESCRIPTION	BY	DATE

MANATEE COUNTY

GULF DRIVE AT MARINA DRIVE INTERSECTION IMPROVEMENTS
FPID: 431020-1-58-01

Cardno TBE
12481 Telecom Drive, Tampa, FL 33637
www.cardnotbe.com - 813.221.0048
Certificate of Authorization No. 3843

MARK W. MODJESKI LICENSE 54838 STATE OF FLORIDA PROFESSIONAL ENGINEER
MARK W. MODJESKI, PE
LIC. NO.: 54838 DATE 12/19/13

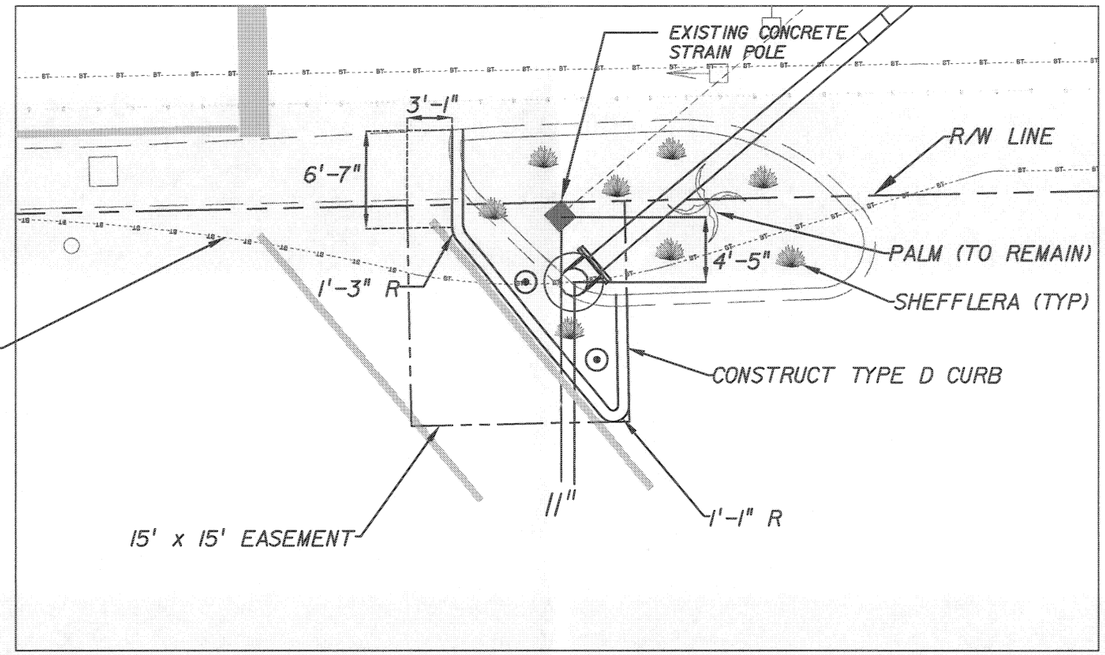
DESIGNED	MWM
DRAWN	BH
Q.C.	MJA
APPROVED	

SIGNALIZATION PLAN

PROJECT NO:	00193-008-021
DATE:	12-12-2013
SHEET NO:	T-5

FILE: J:\JOB\0193\00193-008-21\ACAD\dwg\PLANSG01.dwg LAST SAVED: Thu, 12/12/13-4:52p PLOTTED: Wed, 12/18/13-4:20p BY: David.Allen

1" = 10'



EXISTING BURIED TELEPHONE LINE
CONTRACTOR SHALL COORDINATE RELOCATION WITH THE UTILITY OWNER.

NO.	DESCRIPTION	BY	DATE

MANATEE COUNTY

GULF DRIVE AT MARINA DRIVE INTERSECTION IMPROVEMENTS FPID: 431020-1-58-01

Cardno TBE
12461 Telecom Drive, Tampa, FL 33637
www.cardnotbe.com - 813.221.0048
Certificate of Authorization No. 3843

MARK W. MODJESKI LICENSE No. 54838 STATE OF FLORIDA PROFESSIONAL ENGINEER
MARK W. MODJESKI LIC. NO.: 54838
12/19/13
DATE

DESIGNED MWM
DRAWN HBH
CHECKED DJA
APPROVED

MAST ARM LOCATION DETAIL

PROJECT NO: 00193-008-021
DATE: 12-12-2013
SHEET NO: T-6

FILE: J:\JOB\0193\00193-008-21\ACAD\dwg\PLANSG01.dwg LAST SAVED: Thu, 12/12/13-4:52p PLOTTED: Wed, 12/18/13-4:20p BY: David.Allen

SPECIAL NOTES:

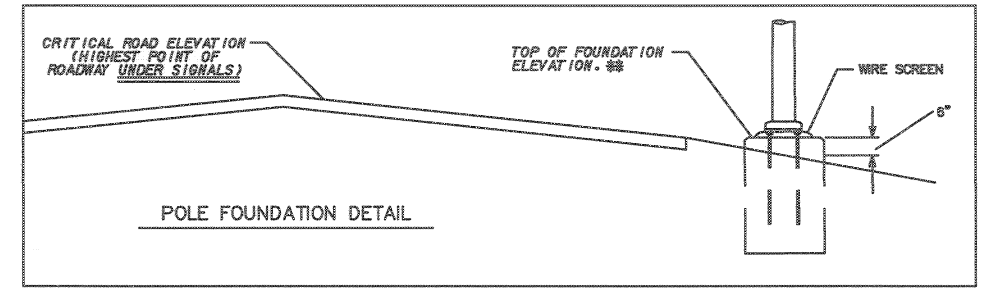
A. EACH POLE AND MAST ARM SHALL BE IDENTIFIED WITH A PERMANENT ONE INCH (1") HIGH ENGRAVED OR IMPRESSED MARK WHICH BEARS THE POLE IDENTIFICATION NUMBER SHOWN ON THE PLANS.

B. ANCHOR BOLT COVERS (ORNAMENTAL, NON-ORNAMENTAL, AND/OR PAINTED) SHALL BE GALVANIZED STEEL OR CAST ALUMINUM AND SHALL BE SECURED BY A MINIMUM OF TWO (2) THREADED FASTENERS. THE BOLT COVERS SHALL BE OF SUFFICIENT SIZE SO THAT THERE IS NO GAP BETWEEN ITSELF AND THE POLE SHAFT.

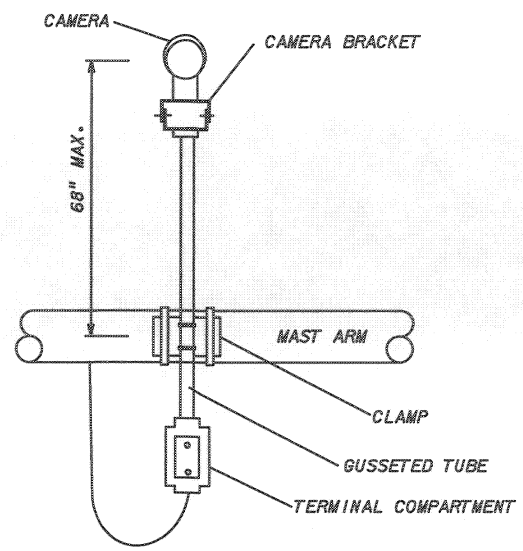
C. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO FIELD VERIFY ALL ELEVATIONS LISTED HEREIN.

D. BACKPLATES REQUIRED FOR ALL SIGNALS HEADS.

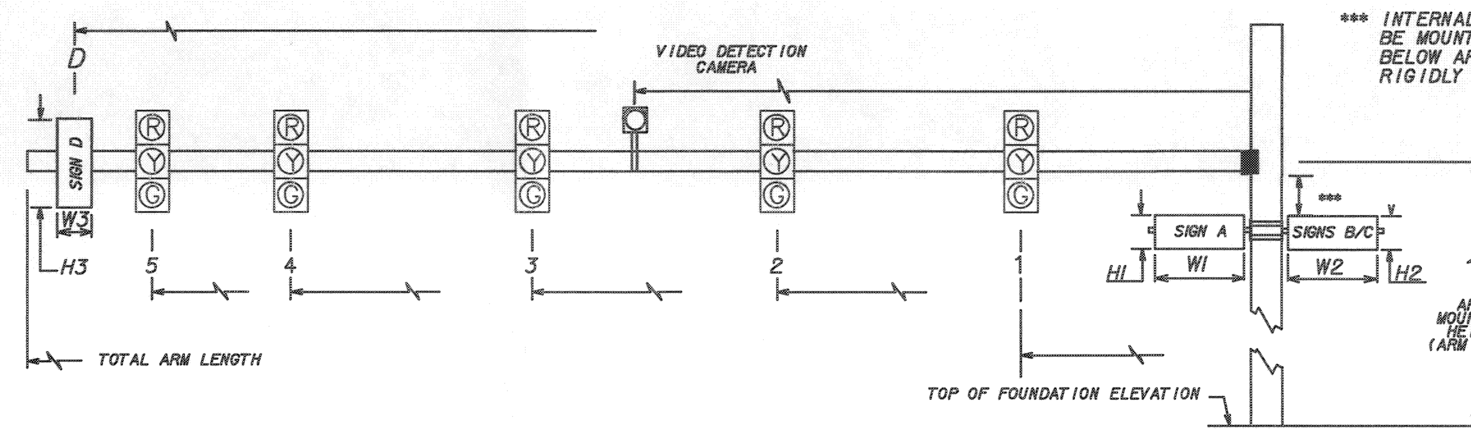
E. CONTRACTOR SHALL COORDINATE WITH THE ENGINEER, IN CONJUNCTION WITH MANATEE COUNTY, FOR THE ACCEPTABLE AND COMPATIBLE VIDEO DETECTION BRACKET TO USE.



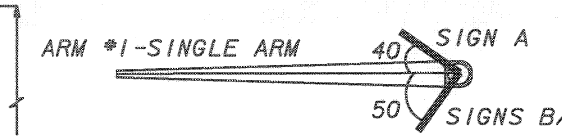
POLE FOUNDATION DETAIL



CAMERA MOUNTING DETAIL
(CONTACT MAINTAINING AGENCY FOR MOUNTING PREFERENCES.)



*** INTERNALLY ILLUMINATED SIGNS "D" AND "E" SHALL BE MOUNTED FREE-SWINGING SIX (6") INCHES BELOW ARM FACE PLATE. POLE #1 HAS THREE RIGIDLY MOUNTED STREET NAME SIGNS.



* DENOTES NUMBER OF SECTIONS IN SIGNAL HEAD ASSEMBLY

STRUCT. ID. NO.	POLE ID. NO.	SHEET NO.	LOCATION BY STA.	CRITICAL ROAD EL.	* FOUNDATION OUT OF GROUND	** TOP OF FOUNDATION ELEVATION	RDWY ARM NO.	SIGNAL DATA: SIGNAL V/H	BACK PLATES Y/N	PED. SIGNAL Y/N	DISTANCE FROM POLE: 1	*	2	*	3	*	4	*	5	*	6	*	7	*	8	*	TOTAL ARM LENGTH	ARM M.H.	∠ BETWEEN DUAL ARMS 90/270	SIGN DATA: DISTANCE FROM POLE / HEIGHT AND WIDTH OF SIGN: A	H1	W1	B/C	H2	W2	–	–	–	–	–	–	–	–	VIDEO DET DISTANCE FROM POLE: 1	2	3	LUM Y/N	LUM ROTATION (DEG)	LUM WATTS
–	1	T-5	–	2.6	0.5	2.6	A	V	Y	N	19.5'	3	25'	3	36'	3	39'	3	46'	3	58'	3					70.5	20	–	N/A	2.5'	6'	N/A	2.5'	6'	–	–	–	–	–	–	–	–	33'	38'	52'	N	–	–
							B	V	Y	N																																							

*** THE TABLE BELOW IS FOR DESIGN PURPOSES ONLY! THE CONTRACTOR SHALL NOT USE INFORMATION BELOW IN PLACEMENT OF THE SIGNALS AND/OR SIGNS. SEE INFORMATION IN THE TABLE LOCATED ABOVE FOR ACTUAL SIGNAL INSTALLATION.

* DENOTES NUMBER OF SECTIONS IN SIGNAL HEAD ASSEMBLY

STRUCT. ID. NO.	POLE ID. NO.	SHEET NO.	LOCATION BY STA.	CRITICAL ROAD EL.	* FOUNDATION OUT OF GROUND	** TOP OF FOUNDATION ELEVATION	RDWY ARM NO.	SIGNAL DATA: SIGNAL V/H	BACK PLATES Y/N	PED. SIGNAL Y/N	DISTANCE FROM POLE: 1	*	2	*	3	*	4	*	5	*	6	*	7	*	8	*	TOTAL ARM LENGTH	ARM M.H.	∠ BETWEEN DUAL ARMS 90/270	SIGN DATA: DISTANCE FROM POLE / HEIGHT AND WIDTH OF SIGN: A	H1	W1	B/C	H2	W2	D	H3	W3	–	–	–	–	–	VIDEO DET DISTANCE FROM POLE: 1	2	3	LUM Y/N	LUM ROTATION (DEG)	LUM WATTS
–	1	T-5	–	2.6	0.5	2.6	A	V	Y	N	19.5'	3	25'	3	36'	3	39'	3	46'	3	58'	3					70.5	20		N/A	2.5'	6'	N/A	2.5'	6'	[illegible]	3'	3'	–	–	–	–	–	33'	38'	52'	N	–	–
							B	V	Y	N																																							

NO.	DESCRIPTION	BY	DATE

MANATEE COUNTY

GULF DRIVE AT MARINA DRIVE INTERSECTION IMPROVEMENTS
FPID: 431020-1-58-01

Cardno TBE
12481 Telecom Drive, Tampa, FL 33637
www.cardnotbe.com - 813.221.0048
Certificate of Authorization No. 3843

STATE OF FLORIDA PROFESSIONAL ENGINEER — MARK W. MODJESKI — LICENSE NO. 54838
MARK W. MODJESKI, P.E.
LIC. NO.: 54838 DATE

DESIGNED MWM
DRAWN HBH
Q.C. DJA
APPROVED

MAST ARM TABULATION AND CALCULATION CONFIGURATION

PROJECT NO: 00193-008-021
DATE: 12-12-2013
SHEET NO: T-7

FILE: J:\JOB\0193\00193-008-21\ACAD\dwg\MastTab.dwg LAST SAVED: Thu, 12/12/13-4:53p PLOTTED: Wed, 12/18/13-4:20p BY: David.Allen

STANDARD MAST ARM ASSEMBLIES DATA TABLE

Table Date 01-01-11

STRUCTURE ID NUMBERS	ASSEMBLY NUMBERS (1)	FIRST ARM			SECOND ARM			UF (deg)	LL (deg)	POLE				SPECIAL DRILLED SHAFT (4)					
		ARM TYPE	FAA (2) (ft.)	FBA (2) (in.)	ARM TYPE	FAA (2) (ft.)	FBA (2) (in.)			POLE TYPE	UAA (3) (ft.)	UB (ft.)	UCA (3) (in.)	DA (ft.)	DB (ft.)	RA	RB	RC	RD (in.)
T-5	D6-S4	D6	*	*	---	---	---	---	---	S4	21.5	20.0	22.99	*	*	*	*	*	*

*STANDARD ARM AND SHAFT LENGTHS. REFER TO STANDARD MAST ARM ASSEMBLIES, INDEX NO. 17743.

TABLE NOTES:

1. Assembly Number Legend

   Single Arm:
   Arm Type - Pole Type = D# - S#
   = E# - T#

   Double Arm:
   First Arm Type - Second Arm Type - Pole Type= D# - D# - S#
   = E# - E# - T#

2. If an entry appears in columns "FAA" and "FBA", a shorter arm is required. This is obtained by removing length from the arm tip. For these cases the mast arm length shall be shortened from "FA" to "FAA" and the tip diameter shall be increased from "FB" to "FBA".

3. If an entry appears in columns "UAA" and "UCA", a shorter pole is required. This is obtained by removing length from the pole tip. For these cases the pole height shall be shortened from "UA" to "UAA" and the pole tip diameter shall be increased from "UC" to "UCA".

4. The foundations for Standard Mast Arm Assemblies are based on the Geotechnical Engineering Services Report by Dunkelberger Engineering and Testing, Inc., dated March 20, 2013. Responsible Engineer is Scott N. Parrish, P.E. No. 69091.

   The following soil parameters were used in design.

   Classification = Cohesionless (Fine Sand)
   Friction Angle = 28 Degrees (28°)
   Unit Weight = 50 lbs. / cu. ft. (assumed saturated)

GENERAL NOTES:

1. Work this sheet with the Signal Designer's "Mast Arm Tabulation". See "Mast Arm Tabulation" for special instructions that may include non-standard Handhole location, paint color, terminal compartment requirement, and/or pedestrian features.

2. Work with index Nos. 17743 and 17745.

3. Design wind speed is 130 mph.

4. Due to the arm loading, the stronger D6-S4 assembly is required instead of the E6-T4 assembly for mast arm T-5.

FRANCIS X. HAUNSTETTER LICENSE No. 56872 STATE OF FLORIDA PROFESSIONAL ENGINEER
FRANCIS X. HAUNSTETTER, PE
LIC. NO. 56872 DATE

NO.	DESCRIPTION	BY	DATE

MANATEE COUNTY

GULF DRIVE AT MARINA DRIVE INTERSECTION IMPROVEMENTS
FPID: 431020-1-58-01

Cardno TBE
380 Park Place Blvd. Suite 300, Clearwater, FL 33759
www.cardnotbe.com - 727.531.2666
Certificate of Authorization No. 3843

DESIGNED	FXH
DRAWN	FXH
CHK.	MAV
APPROVED	FXH

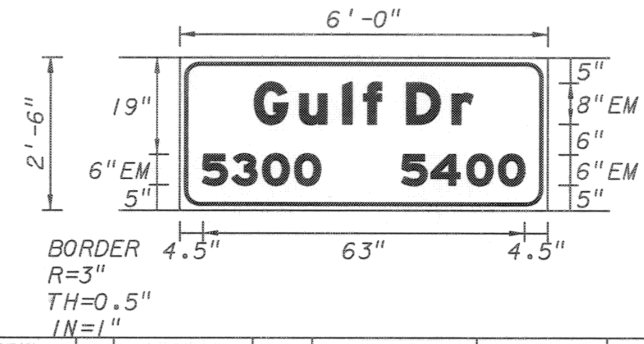
TABLE OF VARIABLES FOR STANDARD MAST ARM ASSEMBLIES

PROJECT NO:	00168-000-021
DATE:	3-25-2013
SHEET NO:	T-6

SIGN NAME	A	QTY	1	SIGN NUMBER	STATION(S)
PANEL		BORDER			none
WIDTH	6'-0"	WIDTH	0.5"		
HEIGHT	2'-6"	RADII	3"		
LEGEND	White	COLOR	White		
COLOR	Green				

SYMBOL(S)	ANGLE	X	Y	WID	HT

SIGN NUMBER	NUMBER OF POSTS	CLEARANCE Edge Of Lane	COLUMN SIZE		AVERAGE LENGTH



NO. OF LIGHT FIXTURES		FIXTURE SPACING		PHOTOMETRIC CURVE		WATT		VOLTAGE	

COPY		G	u	l	f		D	r		L	
SPACE	14.7	8.9	8.5	4	3.4	5	8.9	4	14.7	42.6	
COPY		5	3	0	0		5	4	0	0		L
SPACE	4.5	5.8	6.1	6.2	5	15.8	5.7	7	6.2	5	4.5	63
COPY												
SPACE												
COPY												
SPACE												
COPY												
SPACE												
COPY												
SPACE												

SIGN NAME		QTY		SIGN NUMBER	STATION(S)
PANEL		BORDER			
WIDTH		WIDTH			
HEIGHT		RADII			
LEGEND		COLOR			
COLOR					

SYMBOL(S)	ANGLE	X	Y	WID	HT

SIGN NUMBER	NUMBER OF POSTS	CLEARANCE Edge Of Lane	COLUMN SIZE		AVERAGE LENGTH

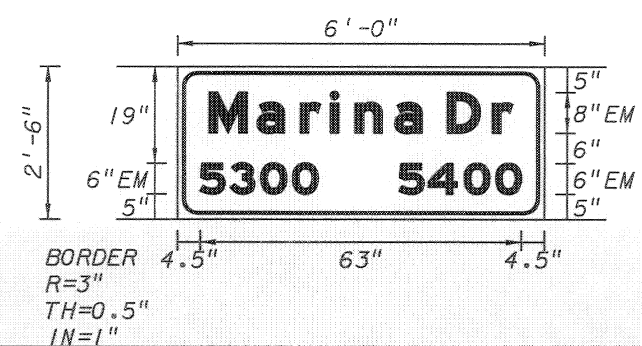
NO. OF LIGHT FIXTURES		FIXTURE SPACING		PHOTOMETRIC CURVE		WATT		VOLTAGE	

COPY		
SPACE		
COPY		
SPACE		
COPY		
SPACE		
COPY		
SPACE		
COPY		
SPACE		
COPY		
SPACE		

SIGN NAME	B	QTY	1	SIGN NUMBER	STATION(S)
PANEL		BORDER			none
WIDTH	6'-0"	WIDTH	0.5"		
HEIGHT	2'-6"	RADII	3"		
LEGEND	White	COLOR	White		
COLOR	Green				

SYMBOL(S)	ANGLE	X	Y	WID	HT

SIGN NUMBER	NUMBER OF POSTS	CLEARANCE Edge Of Lane	COLUMN SIZE		AVERAGE LENGTH



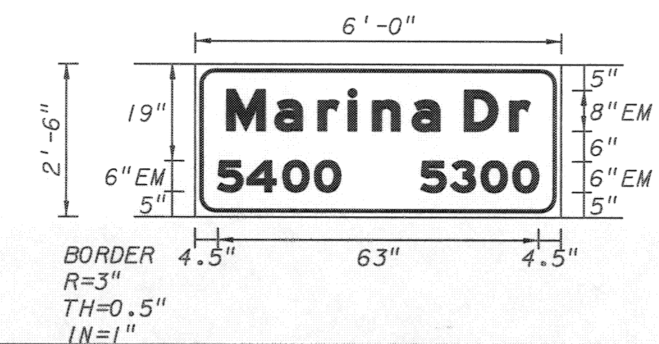
NO. OF LIGHT FIXTURES		FIXTURE SPACING		PHOTOMETRIC CURVE		WATT		VOLTAGE	

COPY		M	a	r	i	n	a		D	r		L
SPACE	6.2	9.4	8.5	5.9	4.8	7.8	5.3	5	8.9	4	6.2	59.6
COPY		5	3	0	0		5	4	0	0		L
SPACE	4.5	5.8	6.1	6.2	5	15.8	5.7	7	6.2	5	4.5	63
COPY												
SPACE												
COPY												
SPACE												
COPY												
SPACE												
COPY												
SPACE												

SIGN NAME	C	QTY	1	SIGN NUMBER	STATION(S)
PANEL		BORDER			none
WIDTH	6'-0"	WIDTH	0.5"		
HEIGHT	2'-6"	RADII	3"		
LEGEND	White	COLOR	White		
COLOR	Green				

SYMBOL(S)	ANGLE	X	Y	WID	HT

SIGN NUMBER	NUMBER OF POSTS	CLEARANCE Edge Of Lane	COLUMN SIZE		AVERAGE LENGTH



NO. OF LIGHT FIXTURES		FIXTURE SPACING		PHOTOMETRIC CURVE		WATT		VOLTAGE	

COPY		M	a	r	i	n	a		D	r		L
SPACE	6.2	9.4	8.5	5.9	4.8	7.8	5.3	5	8.9	4	6.2	59.6
COPY		5	4	0	0		5	3	0	0		L
SPACE	4.5	5.7	7	6.2	5	15.8	5.8	6.1	6.2	5	4.5	63
COPY												
SPACE												
COPY												
SPACE												
COPY												
SPACE												
COPY												
SPACE												

NO.	DESCRIPTION	BY	DATE

MANATEE COUNTY

GULF DRIVE AT MARINA DRIVE INTERSECTION IMPROVEMENTS
FPID: 431020-1-58-01

Cardno TBE
12481 Telecom Drive, Tampa, FL 33637
www.cardnotbe.com - 813.221.0048
Certificate of Authorization No. 3843

MARK W. MODJESKI LICENSE No. 54836 STATE OF FLORIDA PROFESSIONAL ENGINEER

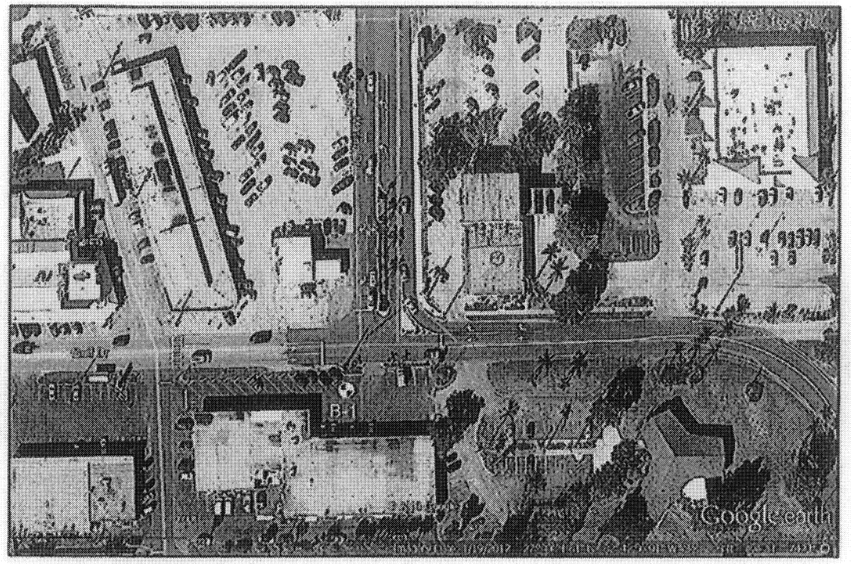
Mark Modjeski 12/19/13
MARK W. MODJESKI, PE
NO. 54836 DATE

DESIGNED	MWM
DRAWN	HBH
Q.C.	DJA
APPROVED	

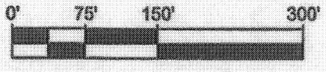
GUIDE SIGN WORKSHEET

PROJECT NO:	00193-008-021
DATE:	12-12-2013
SHEET NO:	T-9

FILE: J:\JOS\0193\00193-008-21\ACAD\dwg\S9_GSW\KSG.dwg LAST SAVED: Thu, 12/12/13-4:52p PLOTTED: Wed, 12/18/13-4:21p BY: David.Allen

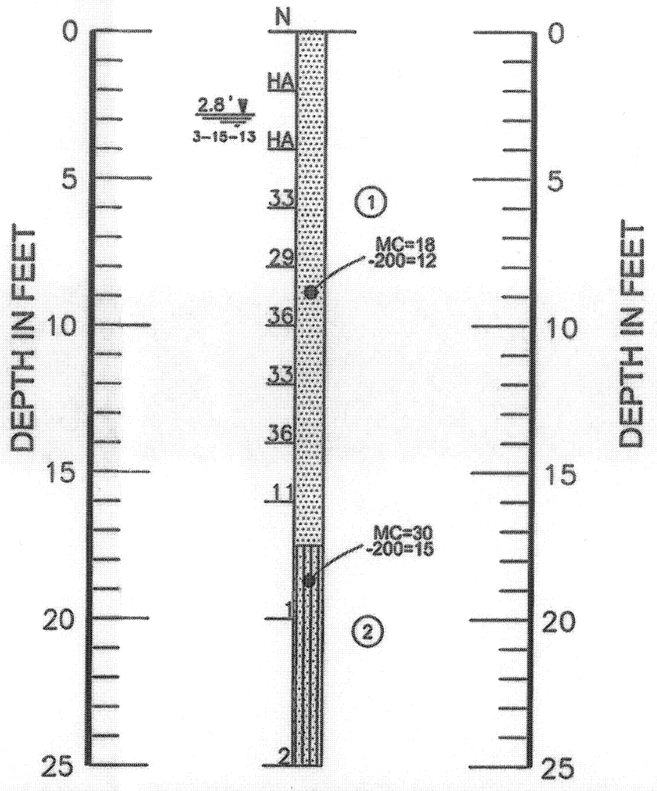


SOURCE: GOOGLE EARTH



⊕ B-1 - STANDARD PENETRATION TEST BORING LOCATION AND NUMBER

BORING NO. B-1



GENERAL LEGEND

① Light gray to dark brown fine SAND, with trace silt to slightly silty, sometimes with shell (SP, SP-SM)

② Dark gray silty fine SAND, with shell fragments (SM)

N – Indicates the number of blows of a 140 pound hammer, freely falling a distance of 30 inches, required to drive a 2-inch diameter sampler 12 inches (ASTM D 1586)

-200 – Amount Passing U.S. Standard No. 200 Sieve (%)

MC – Moisture Content (%)

HA – Hand auger 4 feet in order to avoid possible conflict with underground utilities

B-1 – Standard Penetration Test (SPT) Boring and number

SP – Unified Soil Classification System Group Symbol (ASTM D 2487)

2.8 ▼ 3-15-13 – Depth of groundwater (feet) & date measured

NOTES

(1) Borings were drilled on March 15, 2013 using a Central Mine Equipment Model 55 (CME 55) drill rig.

(2) Strata boundaries are approximate and represent soil strata at each test hole location only. Soil transitions may be more gradual than implied.

(3) Groundwater depths shown on the subsurface profiles represent groundwater surfaces on the dates shown. Groundwater level fluctuations should be anticipated throughout the year.

SUMMARY OF FOUNDATION DESIGN PARAMETERS

Boring No.	Depth (feet)	Range of SPT - N	Unit Weights (PCF) Moist	Unit Weights (PCF) Submerged	Angle of Interval Friction (degrees)	Effective Cohesion (PSF)	Earth Pressure Coefficients Ka	Earth Pressure Coefficients Kp
B-1	0-17	11-36	110	50	32	0	0.307	3.25
	17-25	1-2	110	50	28	0	0.361	2.77

STANDARD PENETRATION TEST DATA

SPOON INSIDE DIA.	1.375 inch
SPOON OUTSIDE DIA.	2.00 inches
AVG. HAMMER DROP	30 inches
HAMMER WEIGHT	140 pounds

SPT DENSITY CHART

GRANULAR MATERIALS- RELATIVE DENSITY	SPT (BLOWS/FOOT)
VERY LOOSE	LESS THAN 4
LOOSE	4 - 10
MEDIUM	10 - 30
DENSE	30 - 50
VERY DENSE	GREATER THAN 50

REVISIONS DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

	BY	DATE
DRAWN BY	GB	3-20-13
CHECKED BY	SNP	3-20-13
APPROVED BY	SCOTT N. PARRISH, P.E.	

Scott Parrish
SCOTT N. PARRISH, P.E. FLORIDA LICENSE NO. 69091
FLORIDA ENGINEERING CERTIFICATE OF AUTHORIZATION NO. 6870
5/20/13

DUNKELBERGER engineering & testing, inc.

ROAD NO.	COUNTY	PROJECT No.
-	MANATEE	

REPORT OF CORE BORING FOR A SIGNAL POLE

PROJECT NAME: GULF DRIVE & MARINA DRIVE - SIGNAL POLE MANATEE COUNTY, FLORIDA

SHEET No. T-10

DET Project No. SAR-12-1493
Sheet 1

Name: Gulf Drive at Marina Drive, Intersection Improvements
IFB No. 14-1226-OV (Project File: 431020-1-58-01)
Revised: February 24, 2014 / March 14, 2014

FLORIDA DEPARTMENT OF TRANSPORTATION
(Construction Contract)
LOCAL AGENCY PROGRAM SUPPLEMENTAL CONDITIONS

The supplemental conditions contained in this section are intended to cooperate with, to supplement, and to modify the general conditions and other specifications. In case of disagreement with any other section of this contract, the Supplemental Conditions shall govern.

1. **Bonding and Prequalification**

Upon award, furnish to the Agency, and maintain in effect throughout the life of the Contract, an acceptable surety bond in a sum at least equal to the amount of the Contract. Execute such bond on the form furnished by the Agency. Obtain a surety that has a resident agent in the State of Florida, meets all of the requirements of the laws of Florida and the regulations of the Agency, and has the Agency's approval. Ensure that the surety's resident agent's name, address and telephone number is clearly stated on the face of the Contract Bond.

A contractor desiring to bid for the performance of any construction contract located on the National Highway System (NHS) or the State Highway System (SHS) in excess of $250,000 must be certified by the Department of Transportation as qualified in accordance with Section 337.14(1), Florida Statutes and Rule 14-22, Florida Administrative Code. Any bid for the performance of any construction contract in excess of $250,000 submitted by a contractor not certified by the Department of Transportation as qualified shall be declared "IRREGULAR" and will be REJECTED.

2. &10. **Buy America and Foreign Contractor and Supplier Restriction**

6-12.2 Source of Supply - Steel (Federal-Aid Contracts Only): For Federal-aid Contracts, only use steel and iron produced in the United States, in accordance with the Buy America provisions of 23 CFR 635.410, as amended. Ensure that all manufacturing processes for this material occur in the United States. As used in this specification, a manufacturing process is any process that modifies the chemical content, physical shape or size, or final finish of a product beginning with the initial melding and mixing and continuing through the bending and coating stages. A manufactured steel or iron product is complete only when all grinding, drilling, welding, finishing and coating have been completed. If a domestic product is taken outside the United States for any process, it becomes foreign source material. When using steel and iron as a component of any manufactured product incorporated into the project (e.g., concrete pipe, pres-stressed beams, corrugated steel pipe, etc.), these same provisions apply, except that the manufacturer may use minimal quantities of foreign steel and iron when the cost of such foreign materials does not exceed 0.1% of the total Contract amount or $2,500, whichever is greater. These requirements are applicable to all steel and iron materials incorporated into the finished work, but are not applicable to steel and iron items that the Contractor uses but does not incorporate into the finished work. Provide a certification from the producer of steel or iron, or any product containing steel or iron as a component, stating that all steel or iron furnished or incorporated into the furnished product was manufactured in the United States in accordance with the requirements of this specification and the Buy America provisions of 23 CFR 635.410, as amended. Such certification shall also include (1) a statement that the product was produced entirely within the United States, or (2) a statement that the product was produced within the United States except for minimal quantities of foreign steel and iron valued at $(actual value). Furnish each such certification to the Engineer prior to incorporating the material into the project. When FHWA allows the use of foreign steel on a project, furnish invoices to document the cost of such material, and obtain the Engineer's written approval prior to incorporating the material into the project.

3. (a)**Change Orders (Changes in the Work)**

Without invalidating the Agreement and without notice to any Surety, County may, at any time, order additions, deletions or revisions in the Work. These will be authorized by a written amendment, a change order, or a work directive change. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract documents (except as otherwise specifically provided).

Contractor shall not be entitled to an increase in the Contract price or an extension of the Contract time with respect to any Work performed that is not required by the Contract documents as amended, modified and supplemented.

County and Contractor shall execute appropriate change orders (or written amendments) covering changes in the Work which are ordered by County, or which may be required because of acceptance of defective Work.

At any time Engineer may request a quotation from Contractor for a proposed change in the Work and within twenty-one (21) calendar days after receipt, Contractor shall submit a written and detailed proposal for an increase or decrease in the Contract price or Contract time for the proposed change. Engineer shall have twenty-one (21) calendar days after receipt of the detailed proposal to respond in writing. The proposal shall include an itemized estimate of all costs and time for performance that will result directly or indirectly from the proposed change. Unless otherwise directed, itemized estimates shall be in sufficient detail to reasonably permit an analysis by Engineer of all material, labor, equipment, subcontracts, overhead costs and fees, and shall cover all Work involved in the change, whether such Work was deleted, added, changed or impacted. Notwithstanding the request for quotation, Contractor shall carry on the Work and maintain the progress schedule. Delays in the submittal of the written and detailed proposal will be considered non-prejudicial.

3. (b) <u>Change Order (Changes of Contract Price)</u>

The Contract price constitutes the total compensation (subject to authorized adjustments) payable to Contractor for performing the Work. All duties, responsibilities and obligations assigned to or undertaken by Contractor shall be at his expense without change in the Contract price.

The Contract price may only be changed by change order or by a written amendment. Any claim for an increase or decrease in the Contract price shall be based on written notice delivered by the party making the claim to the other party. Notice of the amount of the claim with supporting data shall be delivered within ten (10) days from the beginning of such occurrence and shall be accompanied by claimant's written statement that the amount claimed covers all known amounts (direct, indirect and consequential) to which the claimant is entitled as a result of the occurrence of said event.

Where the Work involved is covered by unit prices contained in the Contract documents, cost will be determined by application of such unit prices to the quantities of the items involved.

By mutual acceptance of lump sum.

On the basis of the cost of the Work, plus a 15% Contractor's fee for overhead and profit. (Contractor shall submit an itemized cost breakdown together with supporting data.)
Either County or Contractor may make a claim for an adjustment in the Contract price. The unit price of an item of Unit Price Work shall be subject to re-evaluation and adjustment under the following conditions:

If the total cost of a particular item of Unit Price Work amounts to 5% or more of the Contract price and the variation in the quantity of the particular item of Unit Price Work performed by Contractor differs by more than 15% from the estimated quantity of such item indicated in the Agreement; and
If there is no corresponding adjustment with respect to any other item of Work; and

If a Contractor believes that it has incurred additional expense as a result thereof; or

The value of any Work covered by a change order or for any claim for an increase or decrease in the contract price shall be determined in one of the following ways (at County's discretion):

Where the Work involved is covered by unit prices contained in the contract documents, cost will be determined by application of such unit prices to the quantities of the items involved.

If the parties are unable to agree as to the effect of any such variations in the quantity of unit price Work performed.

3. (c) Change Order (Changes of Contract Time)

Contract time may only be changed by a change order or a written amendment. Any claim for an extension or shortening of the Contract time shall be based on written notice delivered by the party making the claim to the other party. Notice of the extent of the claim with supporting data shall be delivered within fifteen (15) days from detection or beginning of such occurrence and shall be accompanied by the claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant has reason to believe it is entitled as a result of the occurrence of said event.

The Contract time will be extended in an amount equal to time lost due to delays beyond the control of Contractor. Such delays shall include, but not be limited to, acts or neglect by County or others performing additional Work; or to fires, floods, epidemics, abnormal weather conditions or acts of God.

All time limits stated in the Contract documents are of the essence.

4. Claims

Reference Invitation for Bid Article 11. Contract Claims

The rendering of a decision by Engineer with respect to any such claim, dispute or other matter (except any which have been waived by the making or acceptance of final payment) will be a condition precedent to any exercise by County or Contractor of such right or remedies as either may otherwise have under the Contract documents or by laws or regulations in respect of any such claim, dispute or other matter. No action, either at law or at equity, shall be brought in connection with any such claim, dispute or other matter later than thirty (30) days after the date on which County/Engineer has rendered such written decision in respect thereof. Failure to bring an action within said thirty (30) day period shall result in Engineer's decision being final and binding on the Contractor. In no event may any such action be brought after the time at which instituting such proceedings would be otherwise barred by the applicable statute of limitations.

Before bringing any action in court pertaining to any claim, dispute or other matter in question(s) arising out of or relating to the Contract documents or the breach thereof, or Engineer's final decision, except for claims which have been waived by the making and acceptance of final payment, the Contractor shall first submit written notice(s) of Contract claims to the Purchasing Official for a decision; within the earlier of sixty (60) days after the last date on which the Contractor provided any goods or services required by the Contract or after the date on which the Contractor knew or should have known such a claim existed. The County Code of Law, Section 2-26-63, Contract Claims, details the requirement and process for such a claim.

5. Contractor Purchased Equipment for State or Local Countyship

County does not allow.

6. **Disadvantage Business Enterprise (DBE)**
Reference: "Legal Requirements and Responsibility to the Public – Disadvantaged Business Enterprise Program" revised 10-23-2012. (FA 11-15-12) (7-13) (See pages 41 - 43).

7. **On-The Job Training Requirements**
As part of the Contractor's equal employment opportunity affirmative action program, training shall be provided as follows:

The Contractor shall provide on-the-job training aimed at developing full journeymen in the type(s) of trade or job classification(s) involved in the work. In the event the Contractor subcontracts a portion of the contract work, he/she shall determine how many, if any, of the trainees are to be trained by the subcontractor provided, that the Contractor shall retain the primary responsibility for meeting the training requirements imposed by this Section. The Contractor shall apply the requirements of this Section to such subcontract.

The number of trainees will be estimated on the number of calendar days of the contract, the dollar value, and the scope of work to be performed. The trainee goal will be finalized at the Post-Preconstruction Trainee Evaluation Meeting and the goal will be distributed among the work classifications based on the following criteria:

1) Determine the number of trainees on Federal Aid Contract:
   (a) No trainees will be required for contracts with a contract time allowance of less than 225 calendar days.
   (b) If the contract time allowance is 225 calendar days or more, the number of trainees shall be established in accordance with the following chart:

Estimated Contract Amount	Trainees Required
Under $1,000,000	0
Over $1,000,000 to $4,000,000	2
Over $4000,000 to $6,000,000	3
Over $6,000,000 to $12,000,000	5
Over $12,000,000 to $18,000,000	7
Over $18,000,000 to $24,000,000	9
Over $24,000,000 to $31,000,000	12
Over $31,000,000 to $37,000,000	13
Over $37,000,000 to $43,000,000	14
Over $43,000,000 to $49,000,000	15
Over $49,000,000 to $55,000,000	16
Over $55,000,000 to $62,000,000	17
Over $62,000,000 to $68,000,000	18
Over $68,000,000 to $74,000,000	19
Over $74,000,000 to $81,000,000	20
Over $81,000,000 to $87,000,000	21
Over $87,000,000 to $93,000,000	22
Over $93,000,000 to $99,000,000	23
Over $99,000,000 to $105,000,000	24
Over $105,000,000 to $112,000,000	25
Over $112,000,000 to $118,000,000	26
Over $118,000,000 to $124,000,000	27
Over $124,000,000 to $130,000,000	28
Over $130,000,000*	

*One additional trainee per $6,000,000 of estimated Construction Contract amount over $130,000,000	

Further, if the Contractor or subcontractor requests to utilize banked trainees as discussed later in this Section, a Banking Certificate will be validated at this meeting allowing credit to the Contractor for previously banked trainees. Banked credits of prime Contractors working as Subcontractors may be accepted for credit. The Contractor's Project Manager, the Construction Project Engineer and the Department's District Contract Compliance Manager will attend this meeting. Within ten days after the Post-Preconstruction Training Evaluation Meeting, the Contractor shall submit to the Department for approval an On-The Job Training Schedule indicating the number of trainees to be trained in each selected classification and the portion of the contract time during which training of each trainee is to take place. This schedule may be subject to change if the following occur:

1. When a start date on the approved On-The-Job Training Schedule has been missed by 14 or more days;
2. When there is a change(s) in previously approved classifications;
3. When replacement trainees are added due to voluntary or involuntary termination

The revised schedule will be resubmitted to and approved by the Department's District Contract Compliance Manager.

The following criteria will be used in determining whether or not the Contractor has complied with this Section as it relates to the number of trainees to be trained:

1. Full credit will be allowed for each trainee that is both enrolled and satisfactorily completes training on this Contract. Credit for trainees, over the established number for this Contract, will be carried in a "bank" for the Contractor and credit will be allowed for those surplus trainees in subsequent, applicable projects. A "banked" trainee" is described as an employee who has been trained on a project, over and above the established goal and for which the Contractor desires to preserve credit for utilization on a subsequent project.
2. Full credit will be allowed for each trainee that has been previously enrolled in the Department's approved training program on another contract and continues training in the same job classification for significant period and completes his/her training on this Contract.
3. Full credit will be allowed for each trainee who, due to the amount of work available in his/her classification, is given the greatest practical amount of training on the contract regardless of whether or not the trainee completes training.
4. Full credit will be allowed for any training position indicated in the approved On-The-Job Training Schedule, if the Contractor can demonstrate that he/she has made his/her a good faith effort to provide training in that classification.
5. No credit will be allowed for trainee whose employment by the Contractor is involuntarily terminated unless the Contractor can clearly demonstrate good cause for this action.

The Contractor shall, as far as is practical, comply with the time frames established in the approved On-The-Job Training Schedule. When this proves to be impractical, a revised schedule shall be submitted and approved as provided above.

Training and upgrading of minorities, women and economically disadvantaged persons

toward journeyman status is a primary objective of this Section. Accordingly, the contractor shall make every effort to enroll minority trainees and women (e.g., by conducting systematic and direct recruitment through public and private sources likely to yield minority and women trainees) to the extent such persons are available within a reasonable area of recruitment. If a non-minority male is enrolled into On-The-Job Training, the On-The-Job Training Notification of Personnel Action Form notifying the District Contract Compliance Manager of such action shall be accompanied by a disadvantaged certification or justification for such action acceptable to the Department's District Contract Compliance Manager. The Contractor will be given an opportunity and will be responsible for demonstrating the steps that he has taken in pursuance thereof, prior to a determination as to whether the Contractor is in compliance with this Section. This training is not intended and shall not be used, to discriminate against any applicant for training, whether a minority, woman or disadvantaged person.

No employee shall be employed as a trainee in any classification in which he/she has successfully completed a training course leading to journeyman status, has been employed as a journeyman, or had had extensive experience in the classification being considered for training. The Contractor shall satisfy this requirement by including appropriate questions in the employee application or by other suitable means. Regardless of the method used, the Contractor's records should document the findings in each case.

The minimum length and type of training for each classification will be established at the Post-Preconstruction Trainee Evaluation Meeting and approved by the Department. Graduation to journeyman status will be based upon satisfactory completion of Proficiency Demonstration set up at the completion of training and established for the specific training classification, completion of the minimum hours in a training classification range, and the employer's satisfaction that the trainee does meet journeyman status in the classification of training. Upon reaching journeyman status, the following documentation must be forwarded to the District Contract Compliance Office:

Trainee Enrollment and Personnel Action form
Proficiency Demonstration Verification Form indicating completion of each standard established for the classification signed by representatives of both the contractor and the Department; and,
A letter stating that the trainee has sufficiently progressed in the craft and is being promoted to journeyman status.

The Department and the Contractor shall establish a program that is tied to the scope of the work in the project and the length of operations providing it is reasonably calculated to meet the equal employment opportunity obligations of the contractor and to qualify the average trainee for journeyman status in the classifications concerned, by at least, the minimum hours prescribed for a training classification. Furthermore, apprenticeship programs registered with the U.S. Department of Labor, Bureau of Apprenticeship and Training or with a State Apprenticeship and Training shall also be considered acceptable provided it is being administered in a manner consistent with the equal employment obligations of Federal Aid highway construction contract. Approval or acceptance of training schedule shall be obtained from the Department prior to commencing work on the classifications covered by the program.

A voluntary On-The-Job Training Program is available to a Contractor which has been awarded a state funded project. Through this program, the Contractor will have the option to train employees on state funded projects for "banked credit" as discussed previously in this provision, to be utilized on subsequent Federal Aid Projects where training is required. Those Contractors availing themselves of this opportunity to train personnel on state funded projects and bank trainee hours for credit shall comply with all training criteria set forth in this Section for

Federal Aid Projects; voluntary banking may be denied by the Department if staff is not available to monitor compliance with the training criteria.

It is the intention of these provisions that training is to be provided in the construction crafts rather than clerk-typists or secretarial type positions. Training is permissible in positions such as office engineers, estimators, etc., where the training is oriented toward construction applications. Training in the laborer classification may be permitted provided that significant and meaningful training is provided and approved by the District Contract Compliance Office. Some offsite training is permissible as long as the training is an integral part of an approved training program and does not compromise a significant part of the overall training.

When approved in advance by the District Contract Compliance Manager, credit will be given for training of persons in excess of the number specified herein under the current contract or a Contractor will be allowed to bank trainees who have successfully completed a training program and may apply those trainees to a training requirement in subsequent project(s) upon approval of the Department's District Contract Compliance Manager. This credit will be given even though the contractor may receive training program funds from other sources, provided such other source do not specifically prohibit the Contractor from receiving other form of compensation. Credit for offsite training indicated above may only be made to the Contractor where he does one or more of the following and the trainees are concurrently employed on a Federal Aid Project; contributes to the cost of the training, provides the instruction to the trainee and pays the trainee's wages during the offsite training period.

No credit shall be given to the Contractor if either the failure to provide the required training, or the failure to hire the trainee as a journeyman for a period ample enough to allow the employee time to gain experience in the training classification or failure to continue training the employee time to gain experience in the training classifications is caused by the Contractor and evidences a lack of good faith on the part of the Contractor in meeting the requirements of this Section.

The Contractor shall compensate the trainee at no less than the laborer rate established in the Contract at the onset of training. This compensation rate will be increased to the journeyman's wage for that classification upon graduation from the training program.

The Contractor shall furnish the trainee a copy of the program he will follow in providing the training. The Contractor shall provide each trainee with a certification showing the type and length of training satisfactorily completed. The Contractor shall enroll a trainee in one training classification at a time to completion before the trainee can be enrolled in another classification on the same project.

The Contractor shall maintain records to document the actual hours each trainee is engaged in training on work being performed as a part of this Contract.

The Contractor shall submit to the District Contract Compliance Manager a copy of an On-The-Job Training Notification of Personnel Action form no later than seven days after the effective date of the action when the following occurs: A trainee is transferred on the project, transferred from the project to continue training on another contract, completes training, is upgraded to journeyman status or voluntary terminates or is involuntary terminated from the project.

The Contractor shall furnish to the District Contract Compliance Manager a copy of a Monthly Time Report for each trainee. The Monthly Time Report for each month shall be

submitted no later than the tenth day of the subsequent month. The Monthly Time Report shall indicate the phases and sub-phases of the number of hours devoted to each.

Highway or Bridge Carpenter Helper, Mechanic Helper, Rodman/Chainman, Timekeeper, trainees will not be approved for the On-The-Job Training Program.

Painters, Electricians and Mechanics are identified as crafts under-utilized by minorities. All training classifications except Laborers are identified as under-utilized by females.

Priority selection should also include those crafts under-utilized and/or void of minorities and/or female by the particular company's workforce.

If the Contractor does not select a training classification that has been targeted as an under-utilized craft, and those classifications can be used for the selection of training for this project, the On-The-Job Training Schedule will not be approved unless written justification for exceptions is attached.

8. **Equal Employment Opportunity**

Equal Employment Opportunity Policy: Accept as the operating policy, the following statement which is designed to further the provision of equal employment opportunity to all persons without regard to their age, race, color, religion, national origin, sex, or disability and to promote the full realization of equal employment opportunity through a positive continuing program:

"It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their age, race, religion, color, national origin, sex, or disability. Such action must include: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship, pre-apprenticeship, and/or on-the-job training."

Equal Employment Opportunity Officer: Designate and make known to the Department's contracting officers an equal employment opportunity officer (hereinafter referred to as the EEO Officer) who must be capable of effectively administering and promoting an active Contractor program employment opportunity and who must be assigned adequate authority and responsibility to do so.

Dissemination of Policy: All members of the Contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action, or who are substantially involved in such action, will be made fully cognizant of, and will implement, the Contractor's equal employment opportunity policy and contractual responsibilities.

Recruitment: When advertising for employees, include in all advertisements for employees the notation "An Equal Opportunity Employer".

Personnel Actions: Establish and administer wages, working conditions, employee benefits, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff and termination without regard to age, race, color, religion, national origin, sex, or disability.

Follow the following procedures:

(1) Conduct periodic inspections of project sites to insure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.

(2) Periodically evaluate the spread of wages paid with each classification to determine any evidence of discriminatory wage practices.

(3) Periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action must include all affected persons.

(4) Investigate all complaints of alleged discrimination made in connection with obligations under this Contract, attempt to resolve such complaints, and take appropriate corrective action. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action must include such other persons. Upon completion of each investigation inform every complainant of all of the avenues of appeal.

Subcontracting: Use the best efforts to ensure subcontractor compliance with their equal employment opportunity policy.

Records and Reports: keep such records as are necessary to determine compliance with the equal employment opportunity obligations. The records kept will be designed to indicate the following:

(1) The number of minority and non-minority group members employed in each work classification on the project.

(2) The progress and efforts being made in cooperation with unions to increase minority group employment opportunities (applicable only to Contractors who rely in whole or in part on unions as a source of their work force).

(3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minority group employees as deemed appropriate to comply with their Equal Employment Opportunity Policy.

(4) The progress and efforts being made in securing the services of minority group subcontractors or subcontractors with meaningful minority group representation among their employees as deemed appropriate to comply with their Equal Employment Opportunity Policy.

All such records must be retained for a period of three years following completion of the contract work and be available at reasonable times and places for inspection by authorized representatives to the Department and the Federal Highway Administration.

Upon request, submit to the Department a report of the number of minority and non-minority group employees currently engaged in each work classification required by this Contract work.

9. Equipment Rental Rates

For any machinery or special equipment (other than small tools), including fuel and lubricant, the

Contractor will receive 100% of the "Rental Rate Blue Book" for the actual time that such equipment is in operation on the work, and 50% of the "Rental Rate Blue Book" for the time the equipment is directed to standby and remain on the project site, to be calculated as indicated below. The equipment rates will be based on the latest edition (as of the date the work to be performed begins) of the "Rental Rate Blue Book for Construction Equipment" or the "Rental Rate Blue Book for Older Construction Equipment," whichever is applicable, as published by Machinery Information Division of PRIMEDIA Information, Inc. (version current at the time of bid), using all instructions and adjustments contained therein and as modified below. On all projects, the Engineer will adjust the rates using regional adjustments and Rate Adjustment Tables according to the instructions in the Blue Book.

Allowable Equipment Rates will be established as set out below:

(1) Allowable Hourly Equipment Rate = Monthly Rate/176 x Adjustment Factors x 100%.
(2) Allowable Hourly Operating Cost = Hourly Operating Cost x 100%.
(3) Allowable Rate Per Hour = Allowable Hourly Equipment Rate + Allowable Hourly Operating Cost.
(4) Standby Rate = Allowable Hourly Equipment Rate x 50%.

The Monthly Rate is The Basic Machine Rate Plus Any Attachments. Standby rates will apply when equipment is not in operation and is directed by the Engineer to standby at the project site when needed again to complete work and the cost of moving the equipment will exceed the accumulated standby cost. Standby rates will not apply on any day the equipment operates for eight or more hours. Standby payment will be limited to only that number of hours which, when added to the operating time for that day equals eight hours. Standby payment will not be made on days that are not normally considered work days on the project.

The County will allow for the cost of transporting the equipment to and from the location at which it will be used. If the equipment requires assembly or disassembly for transport, the County will pay for the time to perform this work at the rate for standby equipment.

Equipment may include vehicles utilized only by Labor, as defined above.

10. Foreign Contractor and Supplier Restriction
This item is combined with item #2 above

11. Incentive/Disincentive Clauses
Not applicable to this contract.

12. Indian Preference On Federal-Aid Projects (Labor & Employment)
Not applicable to this contract.

13. REQUIREMENTS FOR FEDERAL JOBS – COMPLIANCE WITH FHWA 1273
The FHWA 1273 Electronic Version, dated May 1, 2012 is posted on the Department's website at the following URL address:
http://www.dot.state.fl.us/specificationsoffice/Implemented/URLinSpecs/files/FHWA1273.pdfTak e responsibility to obtain this information and comply with all requirements posted on this website up through five calendar days before the opening of bids. Comply with provisions contained in FHWA 1273. In addition to the requirements of Section IV, No. 3(a), include gender and race in the weekly annotated payroll records. If the Department's website cannot be accessed, contact the Department's Specifications Office Web Coordinator at (850) 414-4101.

15. Liquidated Damages

Applicable liquidated damages are the amounts established in the following schedule:

Contract Amount	Daily Charge Per Day
$50,000 and under	$642
Over $50,000 but less than $250,000	$758
$250,000 but less than $500,000	$966
$500,000 but less than $2,500,000	$1532
$2,500,000 but less than $5,000,000	$2374
$5,000,000 but less than $10,000,000	$3226
$10,000,000 but less than $15,000,000	$4624
$15,000,000 but less than $20,000,000	$4276
$20,000,000 and over	$7684 plus 0.00005 of any amount over $20 million

For all contracts, regardless of whether the contract time is stipulated in calendar days or working days, the Engineer will count default days in calendar days. If the Contractor or, in case of his default, the surety fails to complete the work within the time stipulated in the Contract, or within such extra time that the County may have granted the Contractor or, in case of his default, the surety shall pay to the County, not as a penalty, but as liquidated damages, in the amount of **$758.00** per calendar day in which work is not completed.

The County has the right to apply, as payment on such liquidated damages, any money the County owes the Contractor.

The County does not waive its right to liquidated damages due under the Contract by allowing the Contractor to continue and finish the work, or any part of it, after the expiration of the Contract Time including granted time extensions.

In the case of default of the Contract and the completion of the work by the County, the Contractor and his surety are liable for the liquidated damages under the Contract, but the County will not charge liquidated damages for any delay in the final completion of the County's performance of the work due to any unreasonable action or delay on the part of the County.

The County considers the Contract complete when the Contractor has completed all work and the County has accepted the work. The County will then release the Contractor from further obligation except as set forth in his bond.

16. State/Local Hiring Preference

County certifies that this contract does not include state or local hiring preferences.

17. Method of Bidding

County certifies that this project shall be awarded to the lowest responsive and responsible bidder.

18. County Force Account/Cost Effective Justification

Not applicable to this contract. County will be utilizing an independent contractor to perform the scope of work

19. Patented/Proprietary Materials

County certifies that neither patented or proprietary materials are required or specifically named in the specifications to be used for this project.

20. Prevailing Minimum Wage

For this contract, payment of predetermined minimum wages applies. The U.S. Department of Labor Wage Rates applicable to this Contract are listed in Wage Rate Decision Number(s) **FL140218 01/03/2014 FL218 Highway, for County,** as modified up through ten days prior to the opening of bids.

Obtain the applicable General Decision(s) (Wage Tables) through the Department's Office of Construction website and ensure that employees receive the minimum compensation applicable. Review the General Decisions for all classifications necessary to complete the project. Request additional classifications through the Engineer's office when needed.

State: Florida

Construction Type: Highway

Counties: Brevard, Collier, Hernando, Hillsborough, Lee, **Manatee,** Martin, Orange, Osceola, Pasco, Pinellas, Polk, Sarasota, Seminole and St Lucie Counties **in Florida.**

IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO REVIEW THE LABOR WAGE RATES APPLICABLE TO THIS CONTRACT TEN DAYS PRIOR TO THE OPENING BID DATE.

General Decision Number: FL140218 01/03/2014 FL218
State: Florida

Construction Type: Highway

County: County in Florida.

HIGHWAY CONSTRUCTION PROJECTS

Modification Number	Publication Date
0	01/03/2014

SUFL2013-036 08/19/2013

	Rates	Fringes
CARPENTER, Includes Form Work.	$ 8.00	0.00
CEMENT MASON/CONCRETE FINISHER	$ 13.89	0.00
ELECTRICIAN	$ 21.80	0.00
HIGHWAY/PARKING LOT STRIPING: Operator (Striping Machine)	$ 16.79	0.00
HIGHWAY/PARKING LOT STRIPING: Painter	$ 12.13	0.00
INSTALLER – GUARDRAIL	$ 11.94	0.28

IRONWORKER, ORNAMENTAL	$ 13.48	0.00
IRONWORKER, REINFORCING	$ 16.39	0.00
IRONWORKER, STRUCTURAL	$ 16.42	0.00
LABORER: Asphalt, Includes Raker, Shoveler, Spreader and Distributor	$ 13.89	0.00
LABORER: Common or General.	$ 10.87	0.00
LABORER: Flagger	$ 11.77	0.00
LABORER: Grade Checker	$ 15.00	0.00
LABORER: Mason Tender - Cement/Concrete	$ 12.93	0.00
LABORER: Pipelayer	$ 13.95	0.00
LABORER: Laborer-Cones/ Barricades/Barrels - Setter/Mover/Sweeper.	$ 13.19	2.11
OPERATOR: Backhoe/Excavator/Trackhoe	$ 14.81	0.00
OPERATOR: Bobcat/Skid Steer/Skid Loader.	$ 12.88	0.00
OPERATOR: Broom/Sweeper	$ 13.69	0.00
OPERATOR: Bulldozer	$ 16.79	0.00
OPERATOR: Concrete Finishing Machine	$ 15.44	0.00
OPERATOR: Crane	$ 21.69	0.00
OPERATOR: Curb Machine	$ 19.67	0.00
OPERATOR: Drill.	$ 14.78	0.00
OPERATOR: Forklift	$ 12.58	0.00
OPERATOR: Gradall.	$ 14.71	0.00

	Rates	Fringes
OPERATOR: Grader/Blade.	$ 18.04	0.00
OPERATOR: Loader	$ 14.51	0.00
OPERATOR: Mechanic	$ 19.49	0.00
OPERATOR: Milling Machine.	$ 16.09	0.00
OPERATOR: Oiler	$ 17.31	0.00
OPERATOR: Paver (Asphalt, Aggregate, and Concrete)	$ 18.32	0.00
OPERATOR: Piledriver	$ 17.23	0.00
OPERATOR: Post Driver (Guardrail/Fences).	$ 19.35	0.00
OPERATOR: Roller	$ 13.79	0.00
OPERATOR: Scraper	$ 11.74	0.00
OPERATOR: Screed.	$ 16.74	0.00
OPERATOR: Tractor	$ 12.89	0.00
OPERATOR: Trencher.	$ 16.07	0.66
PAINTER: Spray.	$ 16.38	0.00
TRUCK DRIVER: Dump Truck	$ 14.22	0.00
TRUCK DRIVER: Flatbed Truck.	$ 14.13	0.00
TRUCK DRIVER: Lowboy Truck	$ 18.29	0.00
TRUCK DRIVER: Slurry Truck	$ 11.96	0.00
TRUCK DRIVER: Water Truck	$ 14.88	0.00

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is union or non-union.

Union Identifiers

An identifier enclosed in dotted lines beginning with characters other than "SU" denotes that the union classification and rate have found to be prevailing for that classification. Example: LUM0198-005 07/01/2011. The first four letters , PLUM, indicate the international union and the four-digit number, 0198, that follows indicates the local union number or district council number where applicable , i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2011, following these characters is the effective date of the most current negotiated rate/collective bargaining agreement which would be July 1, 2011 in the above example.

Union prevailing wage rates will be updated to reflect any changes in the collective bargaining agreements governing the rates.

0000/9999: weighted union wage rates will be published annually each January.

Non-Union Identifiers

Classifications listed under an "SU" identifier were derived from survey data by computing average rates and are not union rates; however, the data used in computing these rates may include both union and non-union data. Example: SULA2004-007 5/13/2010. SU indicates the rates are not union majority rates, LA indicates the State of Louisiana; 2004 is the year of the survey; and 007 is an internal number used in producing the wage determination. A 1993 or later date, 5/13/2010, indicates the classifications and rates under that identifier were issued as a General Wage Determination on that date.

Survey wage rates will remain in effect and will not change until a new survey is conducted.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

21. Progress Payments/Estimates

Partial Payments

General: The Engineer will make partial payments on monthly estimates based on the amount of work that the Contractor completes during the month (including deliver of certain materials, as specified herein below). The Engineer will make approximate monthly payments, and the County will correct all partial estimates and payments in the subsequent estimates and in the final estimate and payment.

The County will base the amount of such payments on the total value of the work that the Contractor has performed to the date of the estimate, based on the quantities completed and the Contract prices, less payments previously made and less any retainage withheld.

Retainage- reference Invitation for Bid section C.06.

Contract amount is defined as the original Contract amount adjusted by approved supplemental agreements. Contract time is defined as the original Contract time adjusted by approved Contract time extensions.

Retainage will be determined for each job on multiple job Contracts. The County will not accept Securities, Certificates of Deposit or letters of credit as a replacement for retainage. Amounts withheld will not be released until payment of the final estimate.

Unsatisfactory Payment Record: In accordance with Sections 255.05 and 337.16 of the Florida Statutes, and the rules of the County, the County may disqualify the Contractor from bidding on future County contracts if the Contractor's payment record in connection with contract work becomes unsatisfactory. The County may also disqualify the surety from issuing bonds for future County contracts if they similarly fail to perform under the terms of their bond.

Withholding Payment for Defective Work: If the County discovers any defective work or material prior to the final acceptance, or if the County has a reasonable doubt as to the integrity of any part of the completed work prior to final acceptance, then the County will not allow payment for such defective or questioned work until the Contractor has remedied the defect and removed any causes of doubt.

Withholding Payment for Failure to Comply: The County will withhold progress payments from the Contractor if he fails to comply with any or all of the following within 60 days after beginning work;

(a) Comply with and submit required paperwork relating to prevailing wage rate provisions, Equal Employment Opportunity, On-The-Job Training and Affirmative Action;
(b) Comply with the requirement to all necessary information, including actual payments to DBEs, all other subcontractors and major suppliers, through the Internet based Equal Opportunity Report System;
(c) Comply with or make a good faith effort to ensure employment opportunity for minorities and females in accordance with the required contract provisions for Federal Aid Construction Contracts, and
(d) Comply with or make a good faith effort to meet On-The-Job Training goals.

The County will withhold progress payments until the Contract has satisfied the above conditions.

Release of Retainage After Acceptance: When the Contractor has furnished the County with all submittals required by the Contract, such as invoices, EEO reports, materials certifications, certification of materials procured, etc., (excluding Contractor's letter of acceptance of final amount due) and the Engineer has determined that the measurement and computation of pay quantities is correct, the County may reduce the retainage to $1,000 plus any amount that the County elects to deduct for defective work.

The County will not allow a semifinal estimate under the provisions of the above paragraphs unless the time elapsing between (1) acceptance of the project and receipt of all test reports, invoices, etc., and (2) submission of the final estimate to the Contractor for acceptance, exceeds or is expected to exceed ten days.

The County may deduct from payment estimates any sums that the Contractor owes to the County on any account. Where more than one project or job (separate job number) is included in the Contract, the County will distribute the reduced retainage as provided in the first paragraph of this Subarticle to each separate project or job in the ratio that the Contract value of the work for the particular job bears to the total Contract amount.

Partial Payments for Delivery of Certain Materials:

General: The County will allow partial payments for new materials that will be permanently incorporated into the project and are stockpiled in approved locations in the project vicinity. Stockpile materials so that they will not be damaged by the elements and in a manner that identifies the project on which they are to be used.

The following conditions apply to all payments for stockpiled materials:

(1) There must be reasonable assurance that the stockpiled material will be incorporated into the specific project on which partial payment is made.
(2) The stockpiled material must be approved as meeting applicable specifications.
(3) The total quantity for which partial payment is made shall not exceed the estimated total quantity required to complete the project.
(4) The Contractor shall furnish the Engineer with copies of certified invoices to document the value of the materials received. The amount of the partial payment will be determined from invoices for the material up to the unit price in the Contract.
(5) Delivery charges for materials delivered to the jobsite will be included in partial payments if properly documented.
(6) Partial payments will not be made for materials which were stockpiled prior to award of the Contract for a project.

Partial Payment Amounts: The following partial payment restrictions apply:

(1) Partial payments less than $5,000 for any one month will not be processed.
(2) Partial payments for structural steel and precast pre-stressed items will not exceed 85% of the bid price for the item. Partial payments for all other items will not exceed 75% of the bid prices of the item in which the material is to be used.
(3) Partial payment will not be made for aggregate and base course material received after paving or base construction operations begin except when a construction sequence designated by the County requires suspension of paving and base

construction after the initial paving operations, partial payments will be reinstated until the paving and base construction resumes.

Off Site Storage: If the conditions of the General section above are satisfied, partial payments will be allowed for materials stockpiled in approved in-state locations. Additionally, partial payments for materials stockpiled in approved out-of-state locations will be allowed if the conditions above and the following conditions are met:

(1) Furnish the County a Materials Bond stating the supplier guarantees to furnish the material described in the Contract to the Contractor and County. Under this bond, the Obligor shall be the material supplier and the Obligees shall be the Contractor and the County. The bond shall be in the full dollar amount of the bid price for the materials described in the contract.
(2) The following clauses must be added to the constructions contract between the Contractor and the supplier of the stockpiled materials:
"Notwithstanding anything to the contrary, <supplier> will be liable to the Contractor and the County should <supplier> default in the performance of this agreement."
"Notwithstanding anything to the contrary, this agreement, and the performance bond issued pursuant to this agreement, does not alter, modify, or otherwise change the contractor's obligation to furnish the materials described in this agreement to the County."
(3) The agreement between the Contractor and the supplier of the stockpiled materials must include provisions that the supplier will store the materials and that such materials are the property of the Contract.

Certification of Payment to Subcontractors: The term "subcontractor," as used herein, includes persons or firms furnishing materials or equipment incorporated into the work or stockpiled for which the County has made partial payment and firms working under equipment-rental agreements. The Contractor is required to pay all subcontractors for satisfactory performance of their Contracts before the County will make a further progress (partial) payment. The Contractor shall also return all retainage withheld to the subcontractors within 30 days after the subcontractor's work is satisfactorily complete, as determined by the County. Prior to receipt of any progress (partial) payment, the prime contractor shall certify that all Subcontractors having an interest in the Contract were paid for satisfactory performance of their Contracts and that the retainage is returned to subcontractors within 30 days after satisfactory completion of the subcontractor's work. Provide this certification in the form designated by the County.

Within 30 days of the Contractor's receipt of the final progress payment or any other payments thereafter, except the final payment, the Contractor shall pay all subcontractors and suppliers having an interest in the Contract for all work completed and materials furnished. The County will honor an exception to the above when the written notification of any such good cause to both the County and the affected subcontractors or suppliers within said 30 day period.

Acceptance and Final Payment Documents: Whenever the Contractor has completely performed the work provided for under the Contract and the Engineer has performed a final inspection and made final acceptance the Engineer will prepare a final estimate showing the value of the work as soon as the Engineer makes the necessary measurements and computations. The Engineer will correct all prior estimates and payments in the final estimate and payment. The County will pay the estimate, less any sums that the County may have deducted or retained under the provisions of the Contract, as soon as practicable after final acceptance of the work, along with all executed supplemental agreements received after final acceptance.

22. Prohibition Against Convict Produced Materials

Source of Supply — Convict Labor (Federal-Aid Contracts Only): Do not use materials that were produced after July 1, 1991, by convict labor for Federal-aid highway construction projects unless the prison facility has been producing convict-made materials for Federal-aid highway construction projects before July 1, 1987.

Use materials that were produced prior to July 2, 1991, by convicts on Federal-aid highway construction projects free from the restrictions placed on the use of these materials by 23 U.S.C. 114. The Department will limit the use of materials produced by convict labor for use in Federal-aid highway construction projects to:

1. materials produced by convicts on parole, supervised release, or probation from a prison or,
2. materials produced in a qualified prison facility.

The amount of such materials produced for Federal-aid highway construction during any 12-month period shall not exceed the amount produced in such facility for use in such construction during the 12-month period ending July 1, 1987.

23. Public Agencies in Competition With the Private Sector

The COUNTY does not allow other Public Agencies to compete with or bid on construction projects against the private sector.

24. Publicly-Owned Equipment

The COUNTY does not allow Contractors the use of publicly owned equipment.

25. Salvage Credits

The COUNTY does not allow the Contractor to get credits for salvageable materials.

26. Standardized Changes Conditions Contract Clauses

Differing site conditions. (i) During the progress of the work, if subsurface or latent physical conditions are encountered at the site differing materially from those indicated in the contract or if unknown physical conditions of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in the work provided for in the contract, are encountered at the site, the party discovering such conditions shall promptly notify the other party in writing of the specific differing conditions before the site is disturbed and before the affected work is performed.

(ii) Upon written notification, the engineer will investigate the conditions, and if it is determined that the conditions materially differ and cause an increase or decrease in the cost or time required for the performance of any work under the contract, an adjustment, excluding anticipated profits, will be made and the contract modified in writing accordingly. The engineer will notify the contractor of the determination whether or not an adjustment of the contract is warranted.

(iii) No contract adjustment which results in a benefit to the contractor will be allowed unless the contractor has provided the required written notice.

(iv) No contract adjustment will be allowed under this clause for any effects caused on unchanged work.

Suspensions of work ordered by the engineer. (i) If the performance of all or any portion of the work is suspended or delayed by the engineer in writing for an unreasonable period of time (not originally anticipated, customary, or inherent to the construction industry) and the

contractor believes that additional compensation and/or contract time is due as a result of such suspension or delay, the Contractor shall submit to the engineer in writing a request for adjustment within 7 calendar days of receipt of the notice to resume work. The request shall set forth the reasons and support for such adjustment.

(ii) Upon receipt, the engineer will evaluate the contractor's request. If the engineer agrees that the cost and/or time required for the performance of the Contract has increased as a result of such suspension and the suspension was caused by conditions beyond the control of and not the fault of the Contractor, its suppliers, or subcontractors at any approved tier, and not caused by weather, the engineer will make an adjustment (excluding profit) and modify the contract in writing accordingly. The contractor will be notified of the engineer's determination whether or not an adjustment of the contract is warranted.

(iii) No contract adjustment will be allowed unless the contractor has submitted the request for adjustment within the time prescribed.

(iv) No contract adjustment will be allowed under this clause to the extent that performance would have been suspended or delayed by any other cause, or for which an adjustment is provided or excluded under any other term or condition of this Contract.

Significant changes in the character of work. (i) The engineer reserves the right to make, in writing, at any time during the work, such changes in quantities and such alterations in the work as are necessary to satisfactorily complete the project. Such changes in quantities and alterations shall not invalidate the contract nor release the surety, and the contractor agrees to perform the work as altered.

(ii) If the alterations or changes in quantities significantly change the character of the work under the Contract, whether such alterations or changes are in themselves significant changes to the character of the work or by affecting other work cause such other work to become significantly different in character, an adjustment, excluding anticipated profit, will be made to the contract. The basis for the adjustment shall be agreed upon prior to the performance of the work. If a basis cannot be agreed upon, then an adjustment will be made either for or against the contractor in such amount as the engineer may determine to be fair and equitable.

(iii) If the alterations or changes in quantities do not significantly change the character of the work to be performed under the contract, the altered work will be paid for as provided elsewhere in the Contract.

(iv) The term ``significant change'' shall be construed to apply only to the following circumstances:

(A) When the character of the work as altered differs materially in kind or nature from that involved or included in the original proposed construction; or

(B) When a major item of work, as defined elsewhere in the contract, is increased in excess of 125 percent or decreased below 75 percent of the original contract quantity. Any allowance for an increase in quantity shall apply only to that portion in excess of 125 percent of original contract item quantity, or in case of a decrease below 75 percent, to the actual amount of work performed.

27. State Produced Materials (Florida or other)

County certifies that preference is not given to contractors who purchases materials from and specifically designated state.

28. State/Local Owned/Furnished/Designated Materials

All materials required for this project shall be furnished by the contractor. Projects located on the National Highway System shall require FHWA approval for direct purchase of materials by the County.

29. Subcontracting

Do not sell, transfer, assign or otherwise dispose of the Contract or Contracts or any portion thereof, or of the right, title, or interest therein, without written consent of the County. If the Contractor chooses to sublet any portion of the Contract, the Contractor must provide a written request to sublet work on the Certification of Sublet Work form developed by the County for this purpose. With the Engineer's acceptance of the request, the contractor may sublet a portion of the work, but shall perform with his own organization work amounting to not less than 30% of the total Contract amount. The Certification of Sublet Work request will be deemed acceptable by the County, for purposes of the County's consent, unless the engineer notifies the Contractor within 5 business days of receipt of the Certification of Sublet Work that the County is not consenting to the requested subletting.

Include in the total Contract amount the cost of materials and manufactured component products, and their transportation to the project site. For the purpose of meeting this requirement the County will not consider off-site commercial production of materials and manufactured component products that the Contractor purchases, or their transportation to the project, as subcontracted work.

If the contractor sublets a part of a Contract item, the County will use only the sublet proportional cost in determining the percentage of subcontracted normal work.

Execute all agreements to sublet work in writing and include all pertinent provisions and requirements of the Contract. Upon request, furnish the County with a copy of the subcontract. The subletting of work does not relieve the County or the surety of their respective liabilities under the Contract.

The County recognizes a subcontractor only in the capacity of an employee or agent of the Contractor and Engineer may require the Contractor to remove the subcontractor as in the case of an employee.

30. Termination of Contract

Reference Invitation for Bid Article 10 Suspension/Termination of Work.

31. Time Extensions

Contract time may only be changed by a change order or a written amendment. Any claim for an extension or shortening of the contract time shall be based on written notice delivered by the party making the claim to the other party. Notice of the extent of the claim with supporting data shall be delivered within fifteen (15) days from detection or beginning of such occurrence and shall be accompanied by the claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant has reason to believe it is entitled as a result of the occurrence of said event.

The contract time will be extended in an amount equal to time lost due to delays beyond the control of Contractor. Such delays shall include, but not be limited to, acts or neglect by County or others performing additional work; or to fires, floods, epidemics, abnormal weather conditions or acts of God.

All time limits stated in the contract documents are of the essence. The provision of this Article shall not exclude recovery for damages (including, but not limited to fees and charges of engineers, architects, attorneys and other professionals and court and arbitration costs) for delay by either party.

All time limits stated in the Contract documents are of the essence.

32. E- VERIFY

Vendor/Contractor:

1. Shall utilize the U.S. Department of Homeland Security's E-Verify system to verify the employment eligibility of all new employees hired by the Vendor / Contractor during the term of the contract; and

2. Shall expressly require any subcontractors performing work or providing services pursuant to the state contract to likewise utilize the U.S. Department of Homeland Security's E-Verify system to verify the employment eligibility of all new employees hired by the subcontractor during the contract term.

33. Title VI – Requirements

The Sub-recipient or Contractor, in accordance with Title VI of the Civil Rights Act of 1964, 78 Stat. 252, 42 U.S.C. 200d to 200d-7 and Title 49, Code of Federal Regulations, Department of Transportation, Subtitle A, Office of the Secretary, Part 21, Non-discrimination in Federally-assisted programs of the Department of Transportation issued pursuant to such Act, County hereby notifies all bidders that it will affirmatively insure that in any contract entered into pursuant to this advertisement, disadvantaged business enterprises as defined at 49 CFR Part 26 will be afforded full opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, religion, national origin, marital status, sex, age, disability in consideration for an award.

During the performance of this contract for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") – agrees as follows:

1. Compliance with Regulations: The contractor shall comply with the Regulations relative to nondiscrimination in federally-assisted programs of the U.S. Department of Transportation (hereinafter "USDOT") Title 49, Code of Federal Regulations, Part 21, as they may be amended from time to time, (herein referred to as the Regulations), which are herein incorporated by reference and made a part of this contract.

2. Nondiscrimination: The Contractor, with regard to the work performed by it during the Contract, shall not discriminate on the basis of race, color, national origin or sex in the selection and retention of subcontractors, including, procurement of materials and leases of equipment. The Contractor shall not participate either directly or indirectly in the discrimination prohibited by Section 21.5 of the Regulations, including employment practices when the Contract covers a program as set forth in Appendix B of the Regulations.

3. Solicitations for Subcontractors, Including Procurements of Materials and Equipment: In all solicitations either by competitive bidding or negotiation made by the Contractor for work to be performed under a subcontract, including procurements of materials or leases of equipment, each potential subcontractor or supplier shall be notified by the Contractor of the Contractor's obligations under this contract and the Regulations relative to nondiscrimination on the basis of race, color, national origin or sex.

4. Information and Reports: The Contractor will provide all information and reports required by the Regulations or directives issued pursuant thereto, and shall permit access to its books,

records, accounts, other sources of information and its facilities as may be determined by the County, and Florida Department of Transportation/Federal Highway Administration, to be pertinent to ascertain compliance with such Regulations, orders and instructions. Where any information required of a Contractor is in exclusive possession of another who fails or refuses to furnish this information the Contractor shall so certify to the County or Florida Department of Transportation/Federal Highway Administration as appropriate, and shall set forth efforts it has made to obtain the information.

5. Sanctions for Noncompliance: In the event of the Contractor's noncompliance with the nondiscrimination provisions of this Contract, the County shall impose such Contract sanctions as it or the Florida Department of Transportation / Federal Highway Administration may determine to be appropriate, including, but are not limited to:

a. Withholding of payments to the Contractor under the contract until the Contractor complies, and/or
b. Cancellation, termination or suspension of the Contract, in whole or in part.

6. Incorporation of Provisions: The Contractor should include the provisions 1 through 6 in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Regulations, or directives issued pursuant thereto. The County or the Florida Department of Transportation / Federal Highway Administration may direct as a means of enforcing such provisions including sanctions for non-compliance, provided, however, that, in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or supplier as a result of such direction, the contractor may ask the County and Florida Department of Transportation / Federal Highway Administration to enter into such litigation to protect the interests of the County, Florida Department of Transportation / Federal Highway Administration and in addition, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

THE CONTRACTOR CERTIFIES THE FOLLOWING STATEMENTS:

34. Non-Collusion Provision

The undersigned hereby certifies, to the best of his or her knowledge and belief, that on behalf of the person, firm, association, or corporation submitting the bid certifying that such person, firm, association, or corporation has not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action, in restraint of free competitive bidding in connection with the submitted bid. Failure to submit the executed statement as part of the bidding documents will make the bid nonresponsive and not eligible for award consideration.

35. Lobbying Certification

"The undersigned hereby certifies, to the best of his or her knowledge and belief, that:
(a) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence either directly or indirectly an officer or employee of any state or federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal Contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(b) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a member of Congress, an officer or employee of Congress, or an employee of a member of Congress in connection with this Federal contract, grant loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-L "Disclosure Form to Report Lobbying", in accordance with its instructions.
(c) The undersigned shall require that the language of this certification be included in the award documents for all sub-awards at all tiers (including subcontracts, sub-grants, and contracts under grants, loans, and cooperative agreements) and that all sub-recipients shall certify and disclose accordingly. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, US Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each failure."

36. Suspension and Debarment

"The Bidder certifies that, neither the firm nor any person associated therewith in the capacity of County, partner, director, officer, principal, investigator, project director, manager, auditor, and/or position involving the administration of federal funds:

(a) is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions, as defined in 49 CFR s29.110(a), by any federal department or agency;
(b) has within a three-year period preceding this certification been convicted of or had a civil judgment rendered against it for: commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a federal, state, or local government transaction or public contract; violation of federal or state antitrust statutes; or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(c) is presently indicted for or otherwise criminally or civilly charged by a federal, state, or local governmental entity with commission of any of the offenses enumerated in paragraph 9(b) of this certification; and

(d) has within a three-year period preceding this certification had one or more federal, state, or local government public transactions terminated for cause or default.
The Bidder certifies that it shall not knowingly enter into any transaction with any subcontractor, material supplier, or vendor who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this project by any federal agency unless authorized by the Florida Department of Transportation."

The Bidder certifies that it shall not knowingly enter into any transaction with any subcontractor, material supplier, or vendor who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this project by any federal agency unless authorized by the Florida Department of Transportation."

THE CONTRACTOR CERTIFIES THE ABOVE STATEMENTS:

_____
Signature

_____
Printed Name

_____
Firm Name

007 LEGAL REQUIREMENTS AND RESPONSIBILITY TO THE PUBLIC – DISADVANTAGED BUSINESS ENTERPRISE PROGRAM.

(REV 10-23-12) (FA 11-15-12) (7-13)

ARTICLES 7-24 (Pages 71 - 73) is deleted and the following substituted.

7-24 Disadvantaged Business Enterprise Program.

7-24.1 Disadvantaged Business Enterprise Affirmative Action Plan: Prior to award of the Contract, have an approved Disadvantaged Business Enterprise (DBE) Affirmative Action Program Plan filed with the Equal Opportunity Office. Update and resubmit the plan every three years. No Contract will be awarded until the Department approves the Plan. The DBE Affirmative Action Program Plan is incorporated into and made a part of the Contract.

7-24.2 Required Contract and Subcontract DBE Assurance Language: In accordance with 49 CFR 26.13 (b), the Contract FDOT signs with the Contractor (and each subcontract the prime contractor signs with a subcontractor) must include the following assurance: "The Contractor, sub-recipient or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The Contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT-assisted Contracts. Failure by the Contractor to carry out these requirements is a material breach of this Contract, which may result in the termination of this Contract or such other remedy as the recipient deems appropriate."

7-24.3 Plan Requirements: Include the following in the DBE Affirmative Action Program Plan:

(a) A policy statement, signed by an authorized representative (president, chief executive officer, or chairman of the contractor), expressing a commitment to use DBEs in all aspects of contracting to the maximum extent feasible, outlining the various levels of responsibility, and stating the objectives of the program. Circulate the policy statement throughout the Contractor's organization.

(b) The designation of a Liaison Officer within the Contractor's organization, as well as support staff, necessary and proper to administer the program, and a description of the authority, responsibility, and duties of the Liaison Officer and support staff. The Liaison Officer and staff are responsible for developing, managing, and implementing the program on a day-to-day basis for carrying out technical assistance activities for DBEs and for disseminating information on available business opportunities so that DBEs are provided an equitable opportunity to participate in Contracts let by the Department.

(c) Utilization of techniques to facilitate DBE participation in contracting activities which include, but are not limited to:

1. Soliciting price quotations and arranging a time for the review of plans, quantities, specifications, and delivery schedules, and for the preparation and presentation of quotations.

2. Providing assistance to DBEs in overcoming barriers such as the inability to obtain bonding, financing, or technical assistance.

3. Carrying out information and communication programs or workshops on contracting procedures and specific contracting opportunities in a timely manner, with such programs being bilingual where appropriate.

4. Encouraging eligible DBEs to apply for certification with the Department.

5. Contacting Minority Contractor Associations and city and county agencies with programs for disadvantaged individuals for assistance in recruiting and encouraging eligible DBE contractors to apply for certification with the Department.

7-24.4 DBE Records and Reports: Submit the following through the Equal Opportunity Compliance System:

1. Anticipated DBE Participation Statement - within 3 business days after the Pre-Construction Conference.

2. Report monthly, through the Equal Opportunity Compliance System on the Department's Website, actual payments (including retainage) made to DBEs for work performed with their own workforce and equipment in the area in which they are certified. Report payments made to all DBE and Minority Business Enterprise (MBE) subcontractors and DBE and MBE construction material and major suppliers.

The Equal Opportunity Office will provide instructions on accessing this system. Develop a record keeping system to monitor DBE affirmative action efforts which include the following:

(a) the procedures adopted to comply with these Specifications;

(b) the number of subordinated Contracts on Department projects awarded to DBEs;

(c) the dollar value of the Contracts awarded to DBEs;

(d) the percentage of the dollar value of all subordinated Contracts awarded to DBEs as a percentage of the total Contract amount;

(e) a description of the general categories of Contracts awarded to DBEs; and

(f) the specific efforts employed to identify and award Contracts to DBEs.

Upon request, provide the records to the Department for review.

Maintain all such records for a period of five years following acceptance of final payment and have them available for inspection by the Department and the Federal Highway Administration.

7-24.5 Counting DBE Participation and Commercially Useful Functions: 49 CFR Part 26.55 specifies when DBE credit shall be awarded for work performed by a DBE. DBE credit can only be awarded for work actually performed by DBEs themselves for the types of work for which they are certified. On the Anticipated DBE Participation Statement only include the dollars that a DBE is expected to earn for work they perform with their own workforce and equipment. Submit a revised Anticipated DBE Participation Statement to reflect changes to the initial Anticipated DBE Participation Statement within 14 business days from the date of the change.

When a DBE participates in a contract, the value of the work is determined in accordance with 49 CFR Part 26.55, for example:

(a) The Department will count only the value of the work performed by the DBE toward DBE goals. The entire amount of the contract that is performed by the DBE's own forces (including the cost of supplies, equipment and materials obtained by the DBE for the contract work) will be counted as DBE credit.

(b)The Department will count the entire amount of fees or commissions charged by the DBE firm for providing a bona fide service, such as professional, technical,

consultant, or managerial services or for providing bonds or insurance specifically required for the performance of a Department-assisted contract, toward DBE goals, provided that the Department determines the fees to be reasonable and not excessive as compared with fees customarily followed for similar services.

(c) When the DBE subcontracts part of the work of its contract to another firm, the Department will count the value of the subcontracted work only if the DBE's subcontractor is itself a DBE. Work that a DBE subcontracts to a non-DBE firm does not count toward DBE goals.

(d) When a DBE performs as a participant in a joint venture, the Department will count the portion of the dollar value of the contract equal to the distinct, clearly defined portion of the work the DBE performs with its own forces toward DBE goals.

(e) The Contractors shall ensure that only expenditures to DBEs that perform a commercially useful function in the work of a contract may be counted toward the voluntary DBE goal.

(f) A DBE performs a commercially useful function when it is responsible for execution of the work of the contract and is carrying out its responsibilities by actually performing, managing, and supervising the work involved. To perform a commercially useful function, the DBE must also be responsible, with respect to materials and supplies used on the contract, for negotiating price, determining quality and quantity, ordering the material, and installing (where applicable) and paying for the material itself.

(g) To determine whether a DBE is performing a commercially useful function, the Department will evaluate the amount of work subcontracted, industry practices, whether the amount the firm is to be paid under the contract is commensurate with the work it is actually performing and the DBE credit claimed for its performance of the work, and other relevant factors.

(h) A DBE does not perform a commercially useful function if its role is limited to that of an extra participant in a transaction, contract, or project through which funds are passed in order to obtain the appearance of DBE participation.

(i) If a DBE does not perform or exercise responsibility for at least 30% of the total cost of its contract with its own workforce, or if the DBE subcontracts a greater portion of the work of a contract than would be expected on the basis of normal industry practice for the type of work involved, the DBE has not performed a commercially useful function.

7-24.6 Prompt Payments: Meet the requirements of 9-5 for payments to all DBE subcontractors.

Chapter 2
Units of Measure

2.1 Abbreviations

Listed below are selected abbreviations used in the Basis of Estimates. For a more complete list of abbreviations, refer to Design Standards, Index No. 001.

AC	Acre
AS	Assembly*
BU	Bushel
CF	Cubic Foot
CO	Cleanout*
CY	Cubic Yard
DA	Day
DD	Dollars per Day
EA	Each
ED	Each Day
GA	Gallon
GK	Gross Kilometer
GM	Gross Mile
HA	Hectare
HR	Hour
KG	Kilogram
KL	Kiloliter
KM	Kilometer
LB	Pound
LF	Foot
LI	Liter
LO	Location
LS	Lump Sum
LU	Luminaire
M1	Meter
M2	Square Meter
M2	Square Meter
M3	Cubic Meter
MB	Board Measure/ Thousand Feet
MG	Thousand Gallons
MH	Man-hour**
MI	Mile
MO	Month
MT	Metric Ton
NK	Net Kilometer
NM	Net Mile
PA	Per Analysis*

PB	Per Building*
PI	Per Intersection*
PL	Plant*
PM	Per Mile*
PS	Per Set*
PW	Per Well*
SF	Square Foot
SY	Square Yard
TH	Therms
TN	Ton
YD	Yard

*Units which may be replaced with unit of Each (EA), upon pay item review
** Units may be replaced with Hour (HR), upon review.

2.2 ACCURACY

Unless otherwise indicated for a specific pay item, accuracy is recorded as follows:

Unit of Measure	Accuracy*
AC	1/10 of an acre
CF	1/10 of a cubic foot
CY	1/10 of a cubic yard
GM	1/1000 of a mile
MB	1/10 of a thousand foot board measure
NM	1/1000 of a mile
TN	1/10 of a Ton
Unit items	Unit quantity: each, assembly, location, set, intersection
Others	To the nearest whole number: pound, foot, square yard, gallon, day,

*Note: Calculations are performed with one additional significant figure, and then rounded to the above accuracy for measurement/payment.

2.3 CONVERSION FACTORS

Linear Measure
25.4 mm/in
0.03937 in/mm
0.3048 m/ft
3.2808 ft/m
0.9144 m/yd
1.0936 yd/m
1.609 km/mi
0.621 mi/km

Area Measure
9 ft^2/yd^2

0.836 m^2/yd^2
1.2 yd^2/m^2
0.40 ha/ac
4047 m^2/ac
2.477 ac/ha
43,560ft^2/ac
4840 yd^2/ac
640 ac/mi^2
0.386 mi^2/km^2
2.590 km^2/mi^2

Volume, Liquid Measure
1728 in^3/ft^3
0.028 m^3/ft^3
0.765 m^3/yd^3
27 ft^3/yd^3
0.2642 gal/l
3.785 l/gal

Force, Weight Measure
2.205 lb/kg
1.10 TN/MT
0.907 MT/TN (short ton)
2000 lb/ton (short ton)
1000 kg/MT

Additional items to be added upon request.

Chapter 2 Revision History

2-20-13: Updated header dates for 2013 edition.
11-23-11: Updated header dates for 2012 edition.
12-1-10: Updated header dates for 2011 edition.
10-30-09: Updated header dates for 2010 edition.
1-28-09: Added 2.2 Accuracy. Renumbered 2.3 Conversion Factors.
10-1-2008: Updated header dates for 2009 edition.

APRIL 15, 2013
PREPARED BY: Marshall H. Dougherty, Jr.
Mark W. Modjeski

SPECIFICATIONS PACKAGE

FOR

FINANCIAL PROJECT ID(S): 431020-1-58-01

FEDERAL FUNDS

A DISTRICT ONE OFF-SYSTEM LOCAL AGENCY PROGRAM PROJECT
MANATEE COUNTY

The applicable Construction Details and Materials divisions (Division II & III) of the 2014 Edition of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction are revised as follows:

I hereby certify that this specifications package has been properly prepared by me, or under my responsible charge, in accordance with procedures adopted by the Florida Department of Transportation.

Signature and Seal: _____
Mark W. Modjeski, P.E.
Date: 12/19/13
Page(s): 1 - 9

SPECIAL PROVISIONS

DEFINITIONS AND TERMS

The following terms, when used in the Contract Documents, have the meaning described:

Department.

Manatee County.

Engineer.

The Professional Engineer, registered in the State of Florida, other than the Engineer of Record or his subcontracted consultant, acting as the project's Construction Engineering Inspection Manager. The Engineer may be County in-house staff or a consultant retained by the County.

Note: In order to avoid cumbersome and confusing repetition of expressions in these Specifications, it is provided that whenever anything is, or is to be done, if, as, or, when, or where "acceptable, accepted, approval, approved, authorized, condemned, considered necessary, contemplated, deemed necessary, designated, determined, directed, disapproved, established, given, indicated, insufficient, ordered, permitted, rejected, required, reserved, satisfactory, specified, sufficient, suitable, suspended, unacceptable, or unsatisfactory," it shall be understood as if the expression were followed by the words "by the Engineer," "to the Engineer," or "of the Engineer."

CONCRETE FOR LAP (OFF-SYSTEM).
(REV 4-5-11) (FA 4-15-11)

SECTION 344
CONCRETE FOR LAP (OFF-SYSTEM)

344-1 Description.

344-1 General: Construct Concrete based on the type of work as described in the Contract and the Concrete Work Categories as defined below.

344-1.2 Work Categories: Construction will fall into one of the following Concrete Work Categories:

344-1.2.1 Concrete Work Category 1: Includes the construction of sidewalks, curb and gutter, ditch and slope pavement, or other non-reinforced cast-in- place or precast elements.

344-1.2.2 Concrete Work Category 2: Includes the construction of precast concrete including concrete barriers, traffic railing barriers, parapets, sound barriers, inlets, manholes, junction boxes, pipe culverts, storm sewers, box culverts, prestressed concrete poles, concrete bases for light poles, highway sign foundations, retaining wall systems, traffic separators or other structural precast elements.

344-1.2.3 Concrete Work Category 3: Includes the work associated with the placement and/or construction of structural cast-in-place concrete requiring a class of concrete specified in FDOT Section 346.

344-2 Materials.

344-2.1 General: Use concrete composed of a mixture of Portland cement, aggregates, and water, with or without chemical or mineral admixtures that meet the following requirements:

344-2.1.1 Portland Cement: Cement shall conform to the requirements of the AASHTO or ASTM designations. Different brands of cement, cement of the same brand from different facilities or different types of cement shall be stored separately and shall not be mixed. Portland cements meeting the requirements of AASHTO M-85 or ASTM C-150 are allowed.

344-2.1.2 Coarse and Fine Aggregates: Aggregates shall meet current FDOT requirements except that source approval by the FDOT is not required.

344-2.1.3 Water: Water shall meet current FDOT requirements.

344-2.1.4 Chemical Admixtures: Chemical admixtures shall meet current FDOT requirements. Admixtures may be added at the dosage rates recommended by the manufacturer.

344-2.1.5 Pozzolans and Slag: Pozzolans and Slag shall meet the current FDOT requirements.

344-2.2 Material Storage: Use a concrete production facility that meets the following requirements.

344-2.2.1 Cementitious Materials Storage: Provide a separate and clearly labeled weatherproof facility to store each brand or type of cementitious material without mixing or contamination. Provide a suitable, safe and convenient means of collecting cementitious material samples at each storage facility.

344-2.2.2 Aggregate Storage: Provide suitable bins, stockpiles or silos to store and identify aggregates without mixing, segregating or contaminating different grades or types of materials. Identify aggregate type/gradation. Handle the aggregates in a manner to minimize segregation and meet the specification requirements when recovered from storage. Continuously and uniformly sprinkle coarse aggregate with water, for 24 hours preceding introduction into the concrete mix. Timers may be used to facilitate the sprinkling of aggregate stockpiles using an alternating on/off method. However, in no event shall the top surface of the stockpile be permitted to become dry prior to batching of concrete. Moisture probes may be used to determine the moisture content of the aggregate. Ensure that the accuracy of the probe is certified annually and verified weekly. Maintain stored aggregates in a well-drained condition to minimize free water content. Provide access for the Engineer to sample the aggregates from the recovery side of the storage facility.

344-3 Production, Mixing and Delivery of Concrete.

344-3.1 Concrete Production Requirements: Use concrete production facilities certified by the National Ready-Mixed Concrete Association (NRMCA), approved by the FDOT.

Produce concrete utilizing equipment that is in good operating condition and operated in a manner to ensure a consistent product. When moisture probes are not used, ensure that the concrete production facility determines the free moisture for the coarse and fine aggregates within two hours prior to each day's batching. On concrete placements expected to exceed three hours, perform an additional moisture test approximately half way through the batching operations and adjust batch proportions accordingly.

Ensure that the calibration of the measuring devices of the concrete production facilities meets the requirements of Chapter 531 of the Florida Statutes, and are in accordance with Chapter 9.2 of the FDOT Materials Manual. At least quarterly, ensure that all scales, meters and other weighing or measuring devices are checked for accuracy by a qualified representative of a scale company registered with the Bureau of Weights and Measures of the Florida

Department of Agriculture. As an alternative, the producer may have this frequency identified in an FDOT approved QC plan. The accuracy of admixture measuring dispensers will be certified annually by the admixture supplier.

When Volumetric Mixers are used for Category I applications, deliver concrete in accordance with the requirements of Volumetric Mixer Manufacturers Bureau (VMMB) and ensure that the vehicle has a VMMB registered rating plate.

344-3.2 Classes of Concrete: Classes of concrete to be used on the project will be defined in the Contract Documents.

344-3.3 Contractors Quality Control: The Contractor will supply a Quality Control (QC) plan to identity to the Agency how quality will be ensured at the project site. During random inspections the Agency will use this document to verify that the construction of the project is in agreement with his QC plan.

344-3.4 Concrete Mix Design: Before producing any concrete, submit the proposed mix design to the Engineer on a form provided by the Agency. Otherwise, the agency will accept mix designs previously described in an FDOT approved QC plan. In any event, use only concrete mix designs having prior approval of the Engineer.

Materials may be adjusted provided that the theoretical yield requirement of the approved mix design is met. Show all required original approved design mix data and batch adjustments and substituted material on an Agency approved concrete delivery ticket. The Engineer may disqualify any concrete production facility for non-compliance with specification requirements.

344-3.5 Delivery: For cast-in-place applications, the maximum allowable mixing and agitation time of concrete is 90 minutes.

Furnish a delivery ticket on a form approved by the Agency with each batch of concrete before unloading at the placement site. The delivery ticket shall be printed. Record material quantities incorporated into the mix on the delivery ticket. Ensure that the Batcher responsible for producing the concrete certifies that the batch was produced in accordance with these Specifications and signs the delivery ticket. The Contractor shall sign the delivery ticket certifying that the concrete was batched, delivered and placed in accordance with these Specifications.

The Contractor shall be responsible for rejecting loads of concrete that do not meet the plastic properties of the approve mix design or the minimum compressive strength requirements.

At the sole option of the Agency, the Engineer may accept concrete at a reduced pay when it is determined that the concrete will serve its intended function.

344-3.6 Placing Concrete:

344-3.6.1 Concreting in Cold Weather: Do not place concrete when the temperature of the concrete at placement is below 45°F.

Meet the air temperature requirements for mixing and placing concrete in cold weather as specified in Section 346. During the curing period, if NOAA predicts the ambient temperature to fall below 35°F for 12 hours or more or to fall below 30°F for more than 4 hours, enclose the structure in such a way that the concrete and air within the enclosure can be kept above 60°F for a period of 3 days after placing the concrete or until the concrete reaches a minimum compressive strength of 1,500 psi.

Assume all risks connected with the placing and curing of concrete. Although the Engineer may give permission to place concrete, the Contractor is responsible for

satisfactory results. If the placed concrete is determined to be unsatisfactory, remove, dispose of, and replace the concrete at no expense to the Agency.

344-3.6.2 Concreting in Hot Weather: Meet the temperature requirements and special measures for mixing and placing concrete in hot weather as specified in Section 346.

When the temperature of the concrete as placed exceeds 75°F, incorporate in the concrete mix a water-reducing retarder or water reducer if allowed by Section 346.

Spray reinforcing steel and metal forms with cool fresh water just prior to placing the concrete in a method approved by the Engineer.

Assume all risks connected with the placing and curing of concrete. Although the Engineer may give permission to place concrete, the Contractor is responsible for satisfactory results. If the placed concrete is determined to be unsatisfactory, remove, dispose of, and replace the concrete at no expense to the Agency.

344-3.7 Mixers: Ensure that mixers are capable of combining the components of concrete into thoroughly mixed and uniform mass, free from balls or lumps of cementitious materials, and capable of discharging the concrete uniformly. Operate concrete mixers at speeds per the manufacturer's design. Do not exceed the manufacturer's rated capacity for the volume of mixed concrete in the mixer, mixing drum, or container.

344-3.8 Small Quantities of Concrete: With approval of the Engineer, small quantities of concrete, less than 3 yd^3 placed in one day and less than 0.5 yd^3 placed in a single placement may be accepted using a pre-bagged mixture. The Agency may verify that the pre-bagged mixture is prepared in accordance with the manufacturer's recommendations and will meet the requirements of this Specification.

344-3.9 Sampling and Testing:

344-3.9.1 Category 1: The Engineer may sample and test the concrete at his discretion to verify its quality. The minimum 28 day compressive strength requirement for this concrete is 2,500 psi.

344-3.9.2: Category 2: Provide a statement of certification from the manufacturer of the precast element that the element meets the quality control and inspection testing requirements of the Contract Documents.

344-3.9.3 Category 3: The Agency will randomly select a sample from each 200 yd^3 or one day's production to determine plastic properties and to make three 4 x 8 inch cylinders for testing by the Agency at 28 days to ensure that the design compressive strength has been met. The Agency may, at its discretion, test additional concrete samples to ensure compliance with the specifications.

344-3.10 Records: Maintain the following records for review for at least 3 years after final acceptance of the project:

1. Approved concrete mix designs.
2. Materials source (delivery tickets, certifications, certified mill test reports).
3. A copy of the scale company or testing agency report showing the observed deviations from quantities checked during calibration of the scales and meters.
4. A copy of the documentation certifying the admixture weighing/measuring devices.
5. For non structural concrete, the Agency will accept recent NRMCA, VMMB or FDOT inspection records certifying the plant or truck can produce concrete. In addition, documentation will be available at the plant or in the truck showing that action has been taken to correct deficiencies noted during the inspections.

344-4 Acceptance of the Work.

344-4.1 Category 1 Work: Category 1 work will be accepted based upon compliance with Production, Mixing and Delivery Requirements specified in 334-3.

344-4.2 Category 2 Work:

Precast elements will be accepted based upon certification from the Contractor that the elements were produced by a production facility on the FDOT's current approved plant list. In addition, the producers QC stamp will be displayed on the element.

344-4.3 Category 3 Work: Category 3 work shall be in full compliance with this Specification, and with current FDOT Specifications, Section 346 and associated Contractor Quality Control (QC) specifications governing cast-in-place concrete. In addition, a Delivery Ticket as described in 344-3.5 will be required for acceptance of the material at the project site.

344-5 Method of Measurement.

The quantities to be paid for will be the items shown in the plans, completed and accepted.

344-6 Basis of Payment.

Prices and payments will be full compensation for all work and materials specified in this Section.

THIS COMPLETES THIS SPECIFICATIONS PACKAGE

TECHNICAL SPECIAL PROVISION

FOR
SECTION 611
ACCEPTANCE PROCEDURES FOR TRAFFIC CONTROL SIGNALS AND DEVICES.

In addition to the requirements as outlined in Section 611 of the Florida Department of Transportation's Standard Specifications for Road and Bridge Construct relative to As-Built drawings, the following additional requirements apply.

As-Build drawings shall include the following information:

- The slope for each pedestrian ramp constructed by the Contractor shall be measured and identified on the As-built drawings. The slope shall be identified in terms of percent of slope.
- The surveyed elevation for the top of each mast arm foundation shall be clearly identified on the As-built drawing.
- Any changes to the plans shall be clearly identified in the As-builts drawings and include full dimensioning and offset to right-of-way by the contractors surveyor.

TECHNICAL SPECIAL PROVISION

FOR
SECTION 711
THERMOPLASTIC TRAFFIC STRIPES AND MARKINGS

In addition to the requirements as outlined in Section 711 of the Florida Department of Transportation's Standard Specifications for Road and Bridge Construction relative to the removal of thermoplastic pavement markings, the following additional requirements apply.

All traffic stripes designated to be removed under pay item 711-17 shall be removed using an EDCO TLR-7 grinder or equal. No scar resulting from the marking removal shall be deeper than ¼" as measured from the surrounding surface to the lowest point in the removed area.

MANATEE COUNTY, FLORIDA

GULF DRIVE AND
MARINA DRIVE
SIGNAL MAST ARMS

DESIGN NOTEBOOK

Cardno TBE Project No. 00193-008-21

March 2013

Manatee County, Florida

Gulf Drive and Marina Drive
Signal Mast Arms

Cardno TBE Project No. 00193-008-21

Table of Contents

Cardno TBE
380 Park Place Blvd., Suite 300
Clearwater, FL 33759
Certificate of Authorization No. 3843

Structures Engineer of Record
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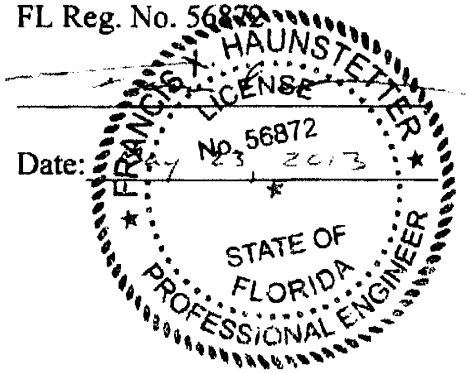
FL Reg. No. 56872



Date: May 23, 2013

1.0 Design Criteria

POLE SELECTION TABLE - SINGLE ARM - WITH & WITHOUT LUMINAIRE

ARM TYPE	D1	D3	D5	D6	D7
POLE TYPE	S1 & S21 Lum	S2 & S22 Lum	S3 & S23 Lum	S4 & S24 Lum	S6

POLE SELECTION TABLE - DOUBLE ARM - WITHOUT LUMINAIRE

ARM TYPE	D1 - D1	D3 - D1	D5 - D2	D6 - D2	D4 - D4	D5 - D4	D6 - D4	D5 - D5	D6 - D5	D6 - D6
POLE TYPE	S1	S2	S2	S4	S3	S4	S4	S4	S4	S5

[illegible]

ARM DESIGN TABLE - ALL CASES

ARM TYPE	ARM LENGTH	MAST ARM				ARM EXTENSION				ARM CONNECTION & WELDS		
		FA/SA (ft)	FB/SB (in)	FC/SC (in)	FD/SD (in)	FE/SE (ft)	FF/SF (in)	FG/SG (in)	FH/SH (in)	MT (in)	FJ/SJ (in)	FK/SK (in)
D1	30'-0"	36	8.96	14	0.1793					30	36	2.5
D2	36'-0"	36	8.90	14	0.1793					30	36	3
D3	40'-0"	38.3	8.92	14	0.1793	11.7	13.36	15	0.313	25	25	2.5
D4	46'-0"	38.3	8.92	14	0.1793	11.7	13.36	15	0.313	30	36	3
D5	50'-0"	38	7.96	12	0.1793	26	12.36	16	0.375	30	36	3
D6	73'-0"	38.4	8.49	15	0.1793	37.1	14.37	19	0.375	30	36	3
D7	78'-0"	40	8.44	14	0.1793	40	13.40	19	0.375	30	34	3

Arm Camber Angle = 2 degrees

POLE, CONNECTION AND SHAFT DESIGN TABLE - SINGLE & DOUBLE ARM

POLE TYPE	UA (ft)	UC (in)	UD (in)	UE (in)	UG (ft)	UPRIGHT BASE CONNECTION					CONNECTION PLATE DATA									DRILLED SHAFT DATA					
						No. Bolts	BA (in)	BB (in)	BC (in)	BF (in)	MT (in)	FI/SI (in)	FL/SL (in)	FN/SN (in)	FO/SO (in)	FP/SP (in)	FR/SR (in)	FS/SS (in)	FT/ST (in)	DA (ft)	DB (ft)	RA	RB	RC	RD (in)
S1	24	12.54	16	0.375		8	30	2.5	1.75	36	20	25	0.75	0.438	15.5	1	2	8	0.438	12	4	11	14	9	12
S2	24	14.54	18	0.375		8	32	2.5	1.75	38	20	25	0.75	0.438	15.5	1	2	8	0.438	12	4.5	11	16	9	12
S3	24	17.54	22	0.375		8	36	2.5	2	40	30	36	0.75	0.438	22	1.25	2.5	12.5	0.438	15	4.5	11	16	10	8
S4	24	23.54	26	0.375		6	42	2.5	2	40	30	36	0.75	0.438	22	1.25	2	12.5	0.438	15	5	11	18	10	8
S5	24	23.54	27	0.375		6	45	2.5	2.25	45	30	36	0.75	0.438	22	1.25	2	12.5	0.438	15	5	11	18	10	8
S6	24	21.54	25	0.375		6	41	2.5	2	40	30	34	0.75	0.5	16.5	1.25	2	12.5	0.5	15	5	11	18	10	8
S21 Lum	39	10.54	16	0.375	37.5	6	30	2.5	1.75	40	20	25	0.75	0.438	11.5	1	2	8	0.438	12	4	11	14	9	12
S22 Lum	39	12.54	18	0.375	37.5	6	32	2.5	1.75	40	20	25	0.75	0.438	12.5	1	2	8	0.438	12	4.5	11	16	9	12
S23 Lum	39	15.54	21	0.375	37.5	6	37	2.5	2	40	30	36	0.75	0.438	15	1.25	2.5	12.5	0.438	14	4.5	11	16	10	8
S24 Lum	39	20.54	26	0.375	37.5	6	42	2.5	2	40	30	36	0.75	0.438	17	1.25	2	12.5	0.438	15	5	11	18	10	8

LUMINAIRE AND LUMINAIRE CONNECTION

LA (ft)	LB (ft)	LC (in)	LD (in)	LE	LF (ft)	LG (in)	LH (in)	LI (in)	LK (in)	LL (deg)	UG (ft)
40	10	3	0.125	0.5	8	0.5	0.75	0.25	0.25	0	37.5

Notes:
1. Work this Index with Index No. 17745.
2. Design Wind Speed = 150 mph with Signal Backplates.

"D" MAST ARMS

LAST REVISION	[illegible]	DESCRIPTION:	FDOT DESIGN STANDARDS 2013	STANDARD MAST ARM ASSEMBLIES	INDEX NO.	SHEET NO.
01/01/12					17743	1

POLE SELECTION TABLE - SINGLE ARM - WITH & WITHOUT LUMINAIRE					
ARM TYPE	E1	E3	E5	E6	E7
POLE TYPE	T1 & T21 Lum	T2 & T22 Lum	T3 & T23 Lum	T4 & T24 Lum	T6

POLE SELECTION TABLE - DOUBLE ARM - WITHOUT LUMINAIRE										
ARM TYPE	E1 - E1	E3 - E1	E5 - E2	E6 - E2	E4 - E4	E5 - E4	E6 - E4	E5 - E5	E6 - E3	E6 - E6
POLE TYPE	T1	T2	T3	T4	T5	T4	T4	T4	T4	T5

Arm 'E' To [illegible] First

ARM DESIGN TABLE - ALL CASES												
ARM TYPE	ARM LENGTH	MAST ARM				ARM EXTENSION				ARM CONNECTION & WELDS		
		FA/SA (ft)	FB/SB (in)	FC/SC (in)	FD/SD (in)	FE/SE (ft)	FF/SF (in)	FG/SG (in)	FH/SH (in)	WT (in)	FJ/SJ (in)	FK/SK (in)
E1	36'-0"	30.0	5.96	11	0.25					22	23	2
E2	50'-0"	36.0	5.98	11	0.25					30	32	2.75
E3	46'-0"	26.3	7.06	12.14	0.25	11.7	11.96	13	0.313	22	23	2
E4	46'-0"	38.5	7.06	12.14	0.25	11.7	11.36	13	0.313	30	32	2.75
E5	60'-0"	30.0	6.10	11.74	0.25	26	10.85	14	0.375	30	32	2.25
E6	70'-6"	33.4	6.63	12.15	0.25	33.1	11.37	16	0.375	30	32	2.75
E7	78'-0"	40.0	7.50	13.10	0.1793	40	12.40	18	0.375	30	32	2.5

Arm [illegible], Angle = 2 Degrees

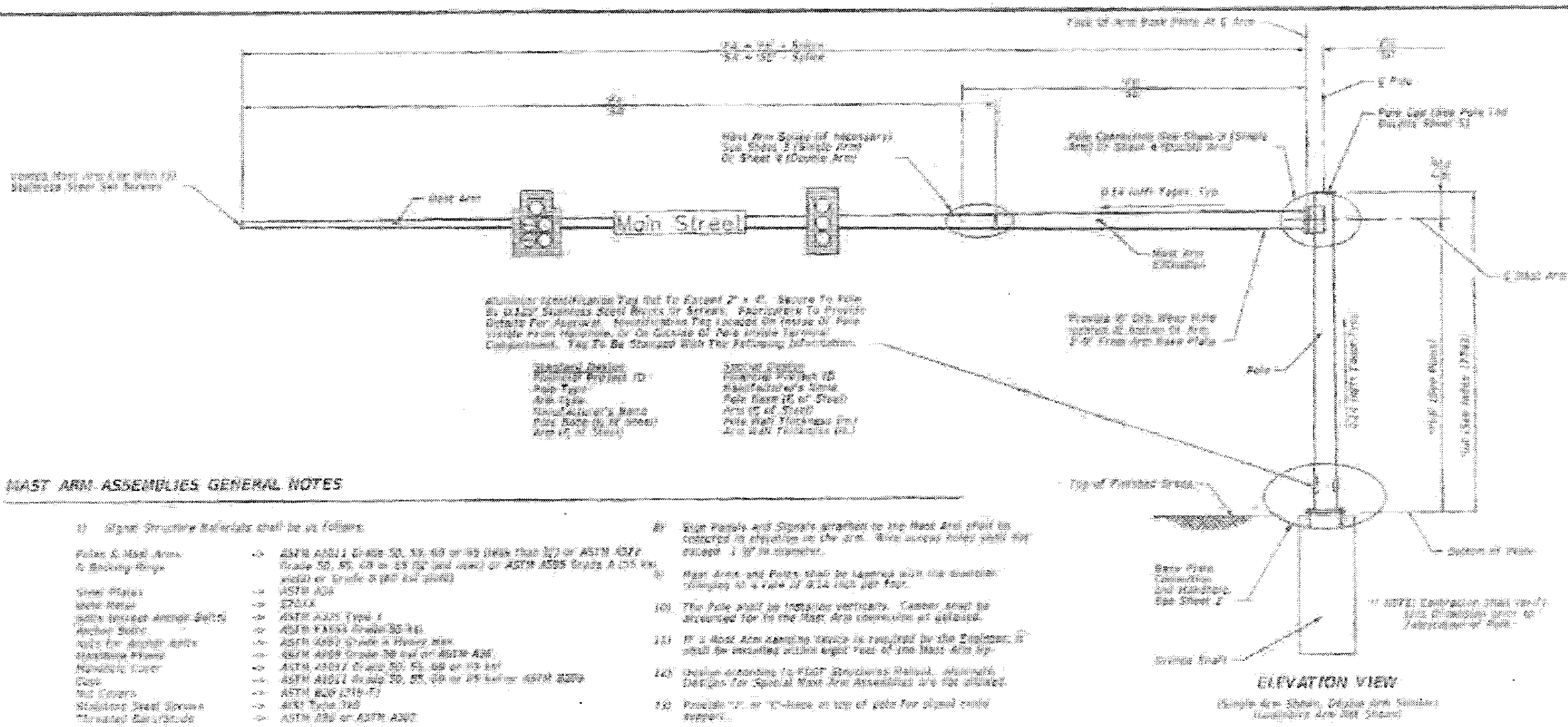
POLE, CONNECTION AND SHAFT DESIGN TABLE - SINGLE & DOUBLE ARM																									
POLE TYPE	UA (ft)	UC (in)	UD (in)	UE (in)	UG (ft)	UPRIGHT BASE CONNECTION					CONNECTION PLATE DATA									DRILLED SHAFT DATA					
						No. Bolts	BA (in)	BB (in)	BC (in)	BF (in)	WT (in)	FJ/SJ (in)	FL/SL (in)	FN/SN (in)	FO/SO (in)	FP/SP (in)	FR/SR (in)	FS/SS (in)	FT/ST (in)	DA (ft)	DB (ft)	RA	RB	RC	RD (in)
T1	24	10.64	14	0.375		6	28	2.5	1.5	36	22	23	0.5	0.375	14	1	2.0	9	0.375	11	4	11	14	8	12
T2	24	12.64	16	0.375		6	28	2.5	1.5	36	22	23	0.5	0.375	14	1	2.0	9	0.375	12	4	11	14	8	12
T3	24	15.64	18	0.375		6	33	2.5	2	40	30	32	0.75	0.375	19.5	1.25	2.25	12.5	0.375	12	4.5	11	16	9	12
T4	24	18.64	22	0.5		6	38	2.5	2	40	30	32	0.75	0.375	19.5	1.25	2.0	12.5	0.375	15	4.5	11	18	10	9
T5	24	18.64	22	0.5		6	38	2.5	2	40	30	32	0.75	0.375	19.5	1.25	2.0	12.5	0.375	18	4.5	11	18	10	9
T6	24	18.64	22	0.375		6	38	2.5	2	40	30	32	0.75	0.438	15	1.25	2.0	12.5	0.438	14	4.5	11	18	10	9
T21 Lum	39	8.54	14	0.375	37.5	6	28	2.5	1.5	40	22	23	0.5	0.375	10	1	2.0	9	0.375	11	4	11	14	8	12
T22 Lum	39	10.54	16	0.375	37.5	6	28	2.5	1.75	40	22	23	0.5	0.375	11	1	2.0	9	0.375	12	4	11	14	8	12
T23 Lum	39	12.54	18	0.375	37.5	6	33	2.5	2	40	30	32	0.75	0.375	13	1.25	2.25	12.5	0.375	12	4.5	11	16	9	12
T24 Lum	39	16.54	22	0.375	37.5	6	38	2.5	2	40	30	32	0.75	0.375	15	1.25	2.0	12.5	0.375	14	4.5	11	18	10	12

LUMINAIRE AND LUMINAIRE CONNECTION											
LA (ft)	LB (ft)	LC (in)	LD (in)	LE	LF (ft)	LG (in)	LH (in)	LJ (in)	LK (in)	LL (deg)	UG (ft)
40	10	3	0.125	0.5	8	8.5	0.75	0.25	0.25	9	37.5

Notes:
1. Work this sheet with Index No. 17745.
2. Design Wind Speed = 150 mph without Signal Backplates.
130 mph with or without Signal Backplates.
110 mph with or without Signal Backplates.

LAST REVISION	REVISION	DESCRIPTION:	FDOT DESIGN STANDARDS 2013	STANDARD MAST ARM ASSEMBLIES	INDEX NO.	SHEET NO.
01/01/12					17743	2

"E" MAST ARMS



ELEVATION VIEW

MAST ARM ASSEMBLIES GENERAL NOTES

1) Signal Structure Materials shall be as follows:

Poles & Mast Arms & Backing Rings	->	ASTM A595 Grade 50, 55, 60 or 65 [illegible] or ASTM A572 Grade 50, 55, 60 or 65 [illegible] or ASTM A595 Grade A (55 ksi yield) or Grade B (60 ksi yield)
Steel Plates	->	ASTM A36
Weld Metal	->	E70XX
Bolts (except Anchor Bolts)	->	ASTM A325 Type 1
Anchor Bolts	->	ASTM F1554 Grade 55 ksi
Nuts for Anchor Bolts	->	ASTM A563 Grade A Heavy Hex
Handhole Frame	->	ASTM A709 Grade 36 [illegible] or ASTM A36
Handhole Cover	->	ASTM A1011 Grade 50, 55, 60 or 65 ksi
Caps	->	ASTM A1011 Grade 50, 55, 60 or 65 ksi or ASTM B209
Nut Covers	->	ASTM B26 (319-F)
Stainless Steel Screws	->	AISI Type 316
Threaded Bars/Studs	->	ASTM A36 or ASTM A307

2) Reinforcing Steel shall be ASTM A615 Grade 60 ksi.

3) Concrete shall be Class IV (Drilled Shaft) with a minimum 28-day compressive strength of 4,000 psi for all environmental classifications.

4) All welding shall conform to American Welding Society Structural Welding Code (Steel) ANSI/AWS D1.1 (current edition).

5) All steel items shall be galvanized as follows:
All Nuts, Bolts, Washers and Threaded Bars/Studs -> F2329
All other steel items including Pole & Mast Arms -> ASTM A123

6) Locate handhole 180° from arm on single arm poles or 180° from first arm of double arm poles or [illegible] on Mast Arm Tabulation Sheet.

7) Except for Anchor Bolts, all bolt hole diameters shall be equal to the bolt diameter plus 1/16" prior to galvanizing. Hole diameters for Anchor Bolts shall not exceed the bolt diameter plus ½".

8) Sign Panels and Signals attached to the Mast Arm shall be centered in elevation on the arm. Wire access holes shall not exceed 1 ½" in diameter.

9) Mast Arms and Poles shall be tapered with the diameter changing at a rate of 0.14 inch per foot.

10) The Pole shall be installed vertically. Camber shall be accounted for in the Mast Arm connection as detailed.

11) If a Mast Arm damping device is required by the Engineer, it shall be installed within eight feet of the Mast Arm tip.

12) Design according to FDOT Structures Manual. Alternate Designs for Special Mast Arm Assemblies are not allowed.

13) Provide "J" or "L"-hook at top of pole for signal cable support.

14) First and Second Arm Center Angle = [illegible].

15) Details for Signal and Sign Locations, Signal Head Attachment, Sign Attachment, Pedestrian Head Attachment, and Foundation Conduit are not shown for clarity.

16) One hundred percent of full-penetration groove welds and a random 25 percent of partial penetration groove welds shall be inspected. Full-penetration groove weld inspection shall be performed by nondestructive methods of radiography or ultrasonics.

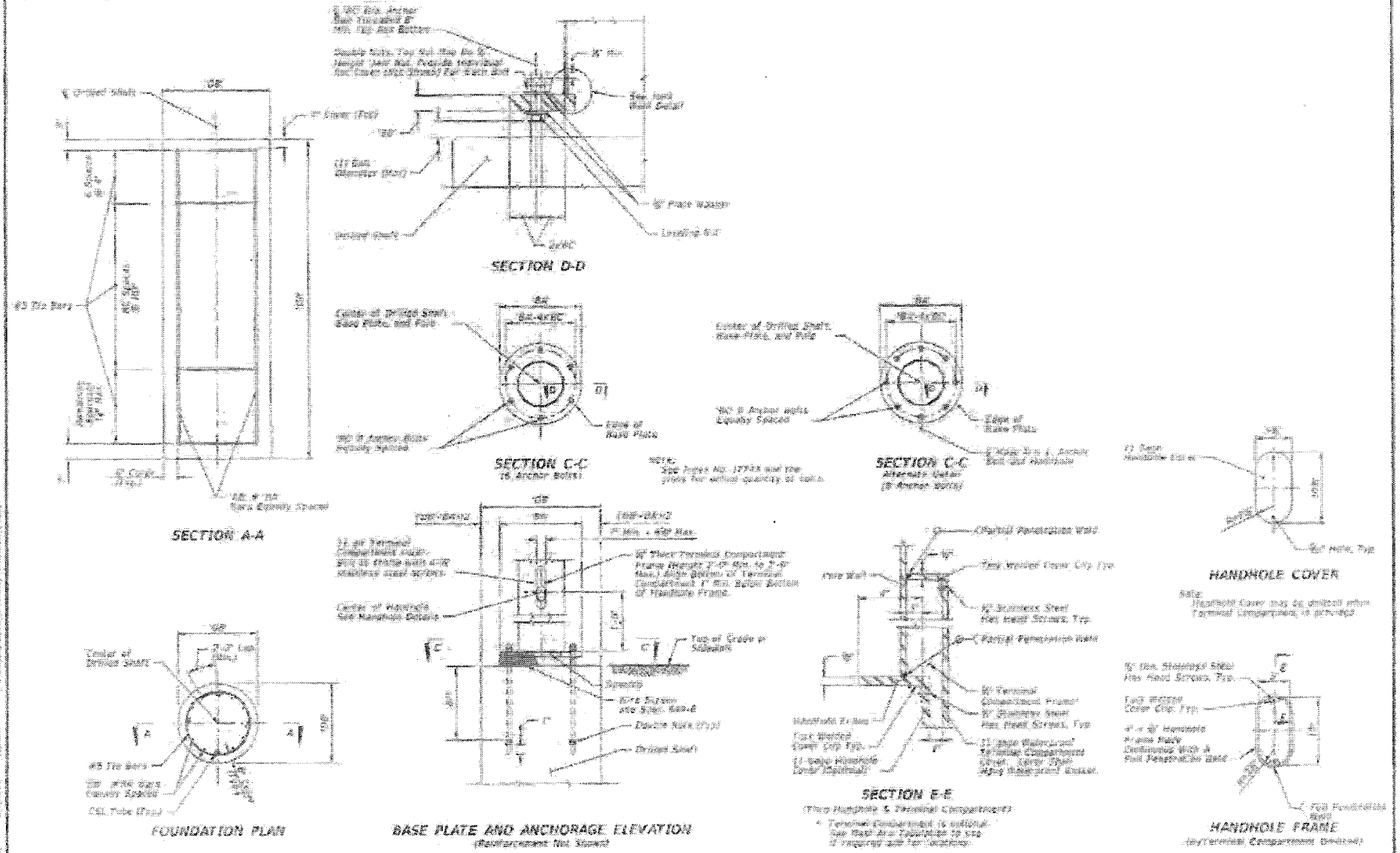
17) Use of split lock-washer is not permitted.

18) In accordance with Specifications 5-1.4.2, Shop Drawings are only required for deviations, deletions, or modifications to this Design Standard.

19) Verify CSL access tubes will not interfere with anchor bolt installation before excavating the shaft. When CSL access tube locations conflict with anchor bolt locations, move the CSL access tube location +/- [illegible] inches along the inside circumference of the reinforcing cage. Notify the Engineer before excavating the shaft if the CSL access tube locations cannot be moved out of conflict with anchor bolt locations.

TYPICAL ELEVATION AND NOTES

LAST REVISION	REVISION	DESCRIPTION:	FDOT DESIGN STANDARDS 2013	MAST ARM ASSEMBLIES	INDEX NO.	SHEET NO.
01/01/12	[illegible]				17745	1



TYPICAL FOUNDATION AND BASE PLATE DETAILS

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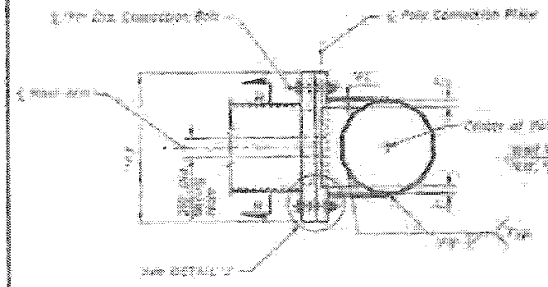
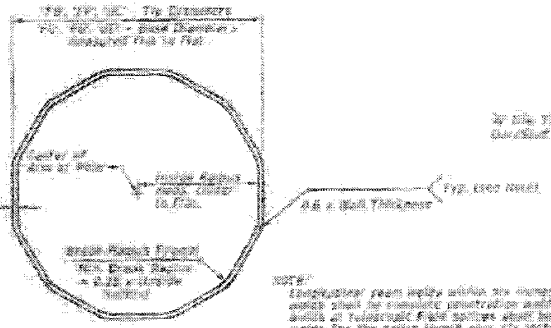
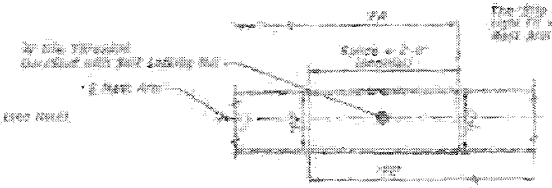
07/01/12						



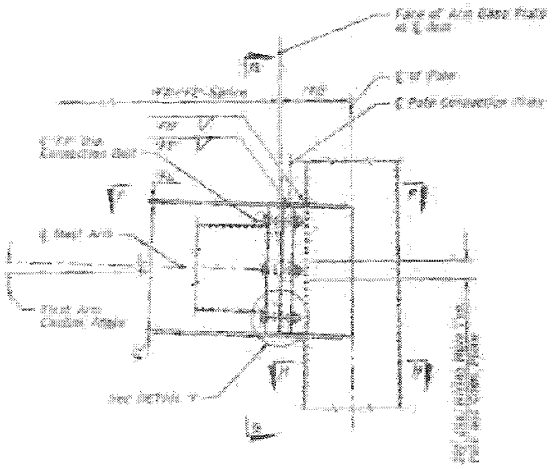
SECTION F-F



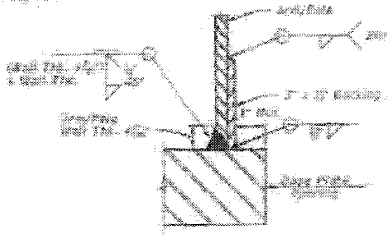
SECTION H-H



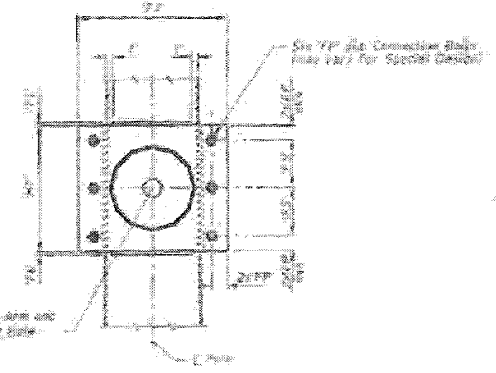
Arm Splice Detail



ELEVATION
(Single Arm Connection)



JOINT WELD DETAIL



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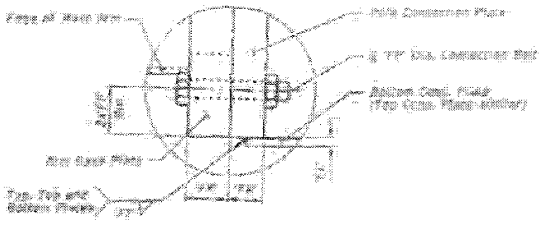
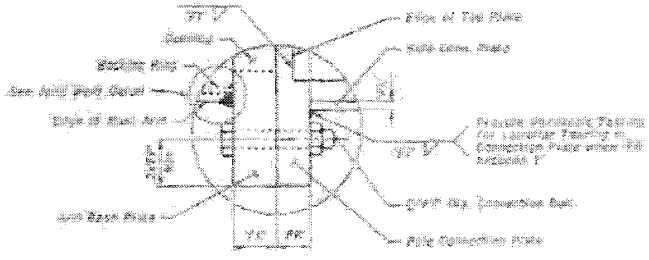


DETAIL 'Y'



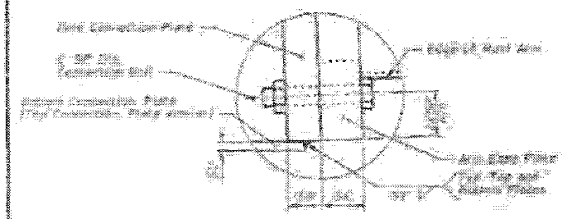
DETAIL 'J'

NOTE:

1. Details shown on this sheet are for 12 sided pole sections. However, identical with more than 12 sides and round sections are permitted provided outside diameter and wall thickness are not reduced.
2. Mast Arm and Connection Plates shall be match marked to ensure proper assembly.

TYPICAL SINGLE ARM CONNECTION DETAILS

LAST REVISION	DESCRIPTION	FDOT DESIGN STANDARDS 2013	MAST ARM ASSEMBLIES	INDEX NO.	SHEET NO.
01/01/12				17745	3



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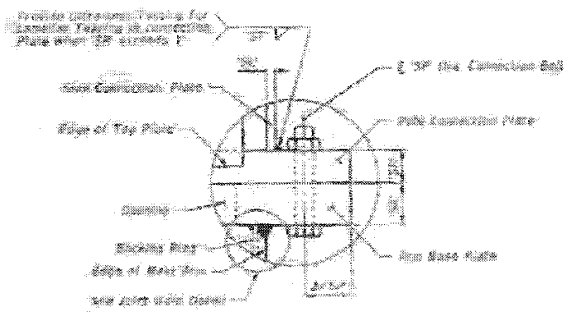

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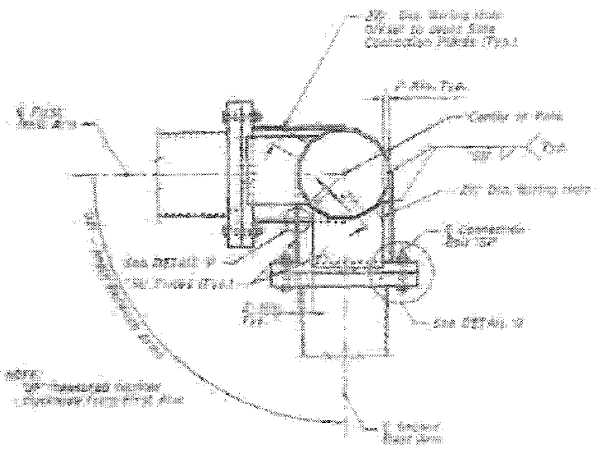
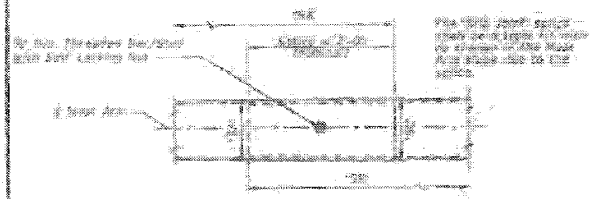
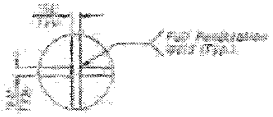


SECTION K-K



Arm Splice Detail



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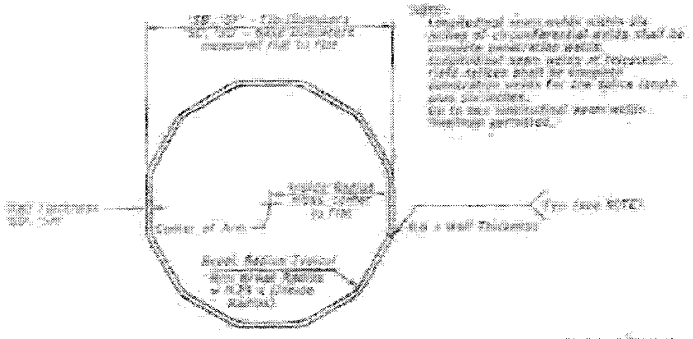
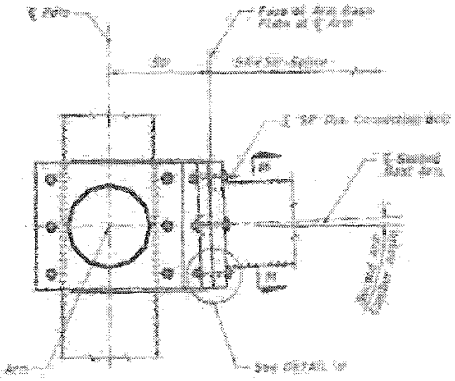


SECTION H-H



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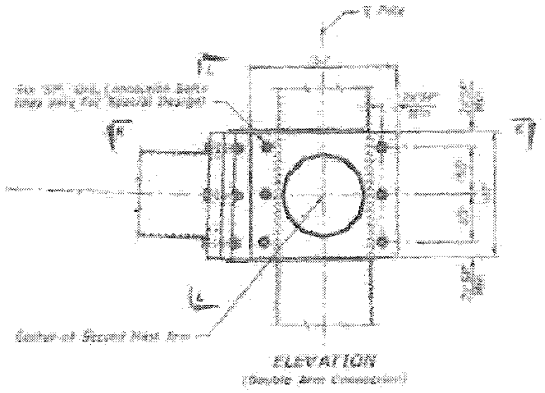

ELEVATION
(Double Arm Connection)

TYPICAL DOUBLE ARM CONNECTION DETAILS

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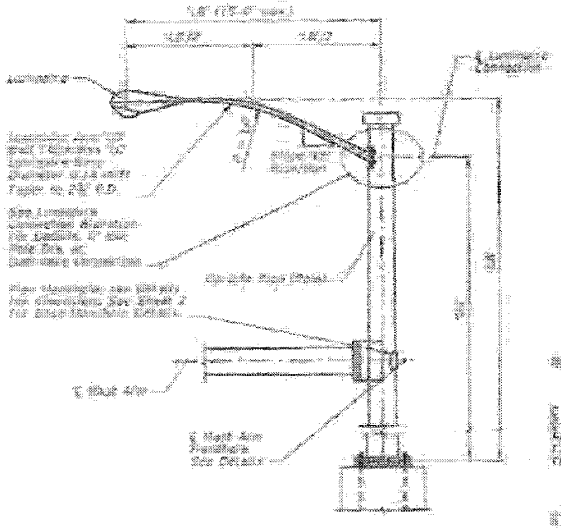
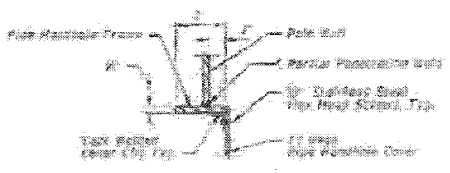
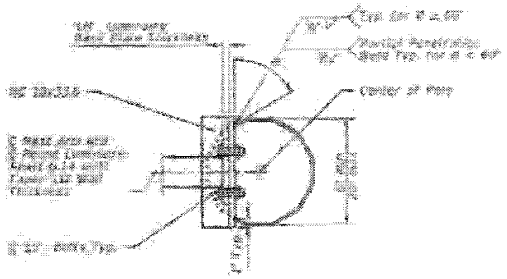
01/01/12				17745	4



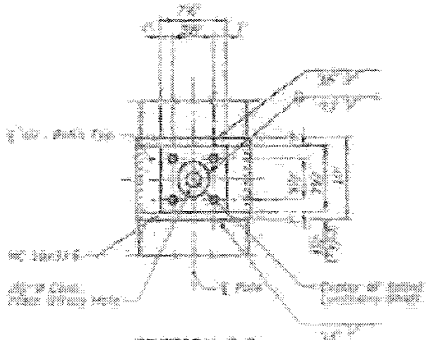
LUMINAIRE ELEVATION



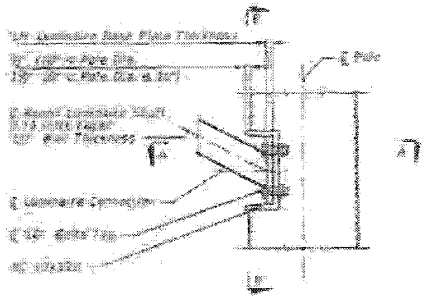
SECTION E-E
(thru Pipe Handhole)



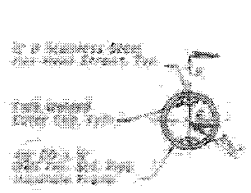
SECTION A-A



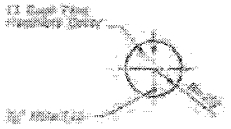
SECTION B-B



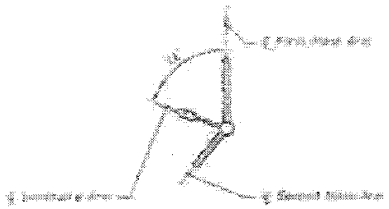
LUMINAIRE CONNECTION ELEVATION



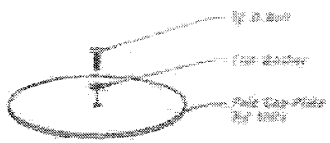
PIPE HANDHOLE FRAME



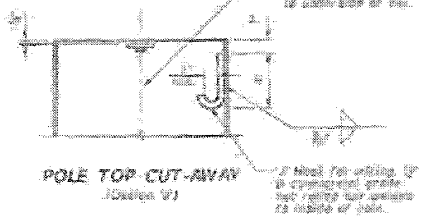
PIPE HANDHOLE COVER



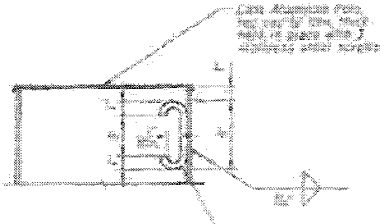
LUMINAIRE ORIENTATION



TOP VIEW



POLE TOP CUT-AWAY
(Option 'A')



POLE TOP CUT-AWAY
(Option 'B')

POLE TOP DETAILS

NOTES:

1. Luminaire type and luminaire to Arm Connection Details can be found elsewhere.
2. Mast Luminaire Arm with single Mast Arm or Tenon Arm of Double Mast Arm unless indicated otherwise in plans.

TYPICAL LUMINAIRE ARM AND CONNECTION DETAILS

LAST REVISION	DESCRIPTION	FDOT DESIGN STANDARDS 2013	MAST ARM ASSEMBLIES	INDEX NO.	SHEET NO.
01/01/12				17745	5

Index 17743 Standard Mast Arm "D" & "E" Assemblies (Rev. 07/12)

Design Criteria

AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, 5th Edition (LTS-5); ***Structures Manual*** Volume 9, FDOT Modifications to LTS-5; ***Structures Manual*** Introduction, I.6 References.

Design Assumptions and Limitations

The maximum span length of Standard Mast Arm Assemblies is 78 feet. See the *PPM*, Volume 1, Chapter 29 for additional information.

See notes on the ***Design Standard*** and ***Structures Manual*** Volume 9.

Design all mast arm traffic signal assemblies with backplates in accordance with the *PPM*, Volume 1, Section 7.4.17

Standard mast arm assemblies must comply with all the requirements and design criteria shown on ***Design Standards*** Index 17745.

Standard Mast Arm Assemblies: Mast arms that utilize all pre-designed components for the selected Load Trees shown in Figure 1.

Standard Mast Arm assemblies are limited to 110,130 or 150 mph design wind speeds with one of the load tree configurations shown in Figure 1, and either single arm, single arm with luminaire, or double arms with arm orientations of 90° or 270° only.

Foundations and base plates for standard mast arm assemblies are pre-designed based on the following soil criteria:

Classification:	Cohesionless (Fine Sand)
Friction Angle:	30 Degrees
Unit Weight:	50 lbs./cubic foot (assumed submerged)

When the designer considers soil types at the specific site location to be of lesser strength properties than shown above, an analysis is required. Auger borings, SPT borings, or CPT soundings may be used as needed to verify the assumed soil properties, and at sites confirmed to be uniform, a single boring or sounding may cover several foundations. Borings in the area that were performed for other purposes may be used to confirm the assumed soil properties. Unique site circumstances may require the foundation variables to be modified from those shown on Index 17743. Accomplish this by completing the "Special Drilled Shaft Data" in the "Standard Mast Arm Assemblies Data Table". The Geotechnical Engineer must justify the differing foundation criteria to the District Structures Design Engineer during the design phase of the project.

To use standard mast arm assemblies:

1. Confirm that the information furnished by the signal designer in the "Mast Arm Tabulation Sheet" meets the geometric and load tree limitations shown in Figure 1.
2. Follow the procedure described in the design examples in the *PPM*, Volume 2, Chapter 24, complete the necessary information required in the "Standard Mast Arm Assemblies Data Table" and include in the Traffic Plans.

Standard Mast Arm Assemblies for Site-Specific Loadings: Mast arms for unique loadings but which utilize all pre-designed components.

The FDOT Mast Arm Program will select component parts from those shown on Index 17743 for site specific load configurations differing from those shown in Figure 1.

In order to be eligible for utilization of pre-designed component parts, the mast arm assemblies must utilize only arms and poles from the components listed in the tables on Index 17743. As for standard mast arm assemblies, the foundation design is included with the pole selection and needs no further information.

Design and detail standard mast arm assemblies utilizing pre-designed component parts in the plans in the same manner as for standard mast arm assemblies by use of the "Standard Mast Arm Assemblies Data Table" cell. Similarly, because all pre-designed component parts are used, shop drawings are not required.

Figure 1

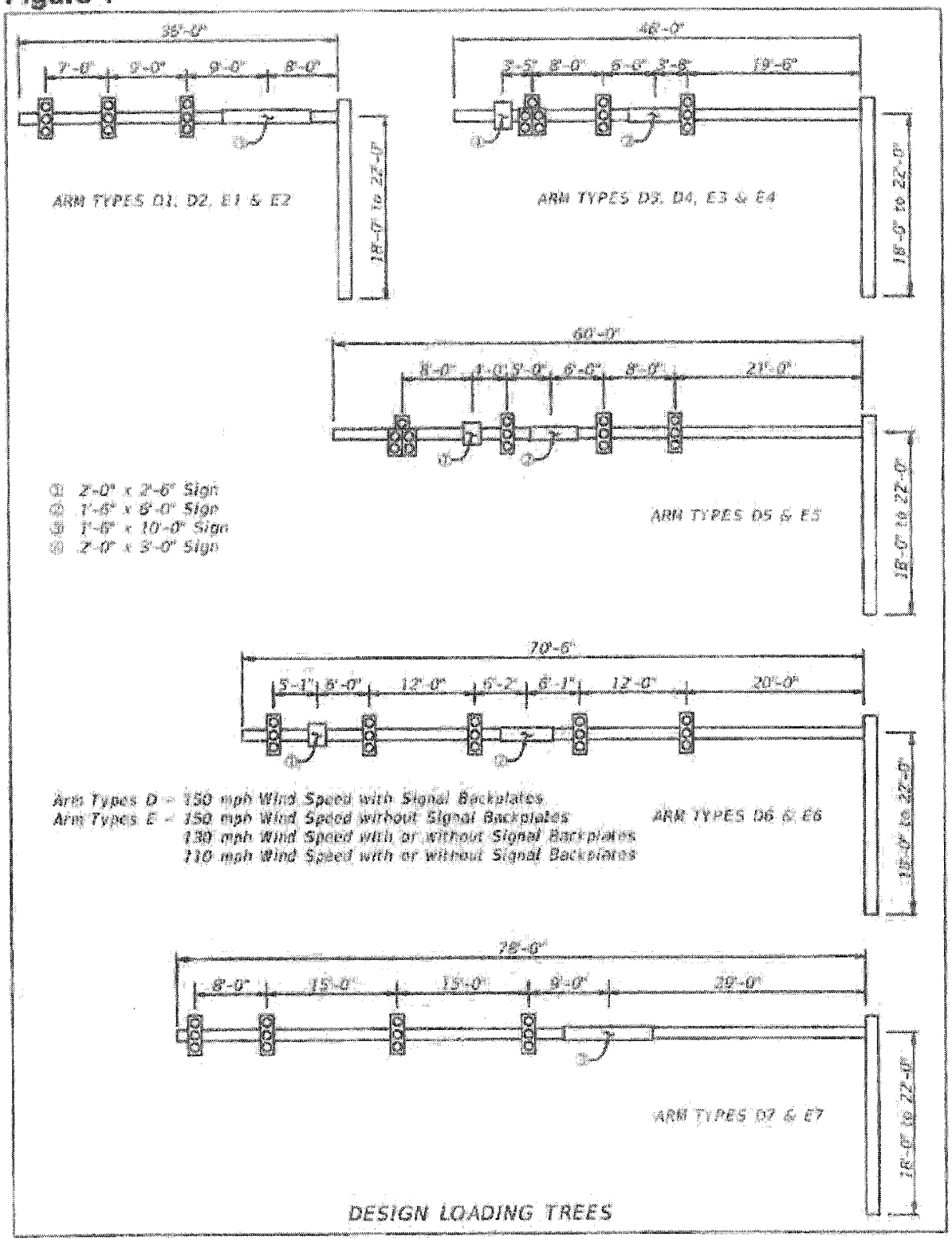

35'-0"
7'-0"
9'-0"
9'-0"
8'-0"
18'-0" to 22'-0"
ARM TYPES D1, D2, E1 & E2
46'-0"
5'-5"
8'-0"
6'-0"
3'-6"
19'-6"
16'-0" to 22'-0"
ARM TYPES D3, D4, E3 & E4
60'-0"
8'-0"
4'-0"
3'-0"
6'-0"
8'-0"
21'-0"
18'-0" to 22'-0"
ARM TYPES D5 & E5
① 2'-0" x 2'-6" Sign
② 1'-6" x 6'-0" Sign
③ 1'-6" x 10'-0" Sign
④ 2'-0" x 3'-0" Sign
70'-6"
5'-1"
8'-0"
12'-0"
6'-2"
6'-1"
12'-0"
20'-0"
18'-0" to 22'-0"
ARM TYPES D6 & E6
Arm Types D – 150 mph Wind Speed with Signal Backplates
Arm Types E – 150 mph Wind Speed without Signal Backplates
130 mph Wind Speed with or without Signal Backplates
110 mph Wind Speed with or without Signal Backplates
78'-0"
8'-0"
15'-0"
15'-0"
9'-0"
29'-0"
18'-0" to 22'-0"
ARM TYPES D7 & E7
DESIGN LOADING TREES

Table 2.10.2 Minimum Vertical Clearances for Signs

SIGNS	CLEARANCE [1, 2]
Overhead Sign Structures	17'-6" over the entire width of the pavement and shoulder to the lowest sign component.

1. Includes 6" for future resurfacing on rural sections.
2. For cantilever structures, the vertical clearance only applies to the portion of the roadway directly beneath the structure.

Table 2.10.3 Minimum Vertical Clearances for Signals

SIGNALS	CLEARANCE [1, 2]
Span Wire Mounted	17'-6" between the pavement and the bottom of any signal assembly.
Mast Arm Mounted	17'-6" over the entire width of the pavement and shoulder to the lowest signal or low point of the arm.
Truss Mounted	17'-6" over the entire width of the pavement and shoulders to the lowest signal or lowest member of the horizontal truss.

1. Includes 6" for future resurfacing on rural sections.
2. For cantilever structures, the vertical clearance only applies to the portion of the roadway directly beneath the structure.

Table 2.10.4 Minimum Vertical Clearances for Overhead Dynamic Message Signs (DMS)

SIGNS	CLEARANCE [1, 2]
Overhead DMS Structures	19'-6" over the entire width of the pavement and shoulder to the lowest sign component.

1. Includes 6" for future resurfacing on rural sections.
2. For cantilever structures, the vertical clearance only applies to the portion of the roadway directly beneath the structure.

2.4.2.4 Variable Message Signs (Rev. 01/13)

Add the following:

For all overhead Variable Message Sign (VMS) structures, the horizontal member shall consist of a truss with a minimum of two chords with a minimum center-to-center distance between the chords of 3'-0". See FDOT section 11.8 for VMS maximum span-to-depth ratios.

FDOT vertical clearance requirements for VMS structures are found in *PPM*, Volume 1, Chapter 2.

C 2.4.2.4
Add the following:
The minimum requirements given provide additional measures to limit the possibility of galloping.

Since cantilever overhead Variable Message Sign (VMS) structures are more susceptible to fatigue than span overhead VMS structures, span structures should be used whenever possible.

In Florida, overhead VMS structures are typically referred to as Dynamic Message Sign (DMS) structures.

2.4.2.5 Horizontal Span and Cantilever Limits

New Section, add the following:

Sign and signal structures shall be limited to the following maximum horizontal lengths:

Structure Type	Max Length
Span Overhead Sign	250 feet
Cantilever Overhead Sign	50 feet
Mast Arm	78 feet
Span Wire Assembly	250 feet

C 2.4.2.5
Add the following:
These limits were chosen based on past practice and practical experience.

A FDOT Design Variation is required when sign or signal structure limits are exceeded. The design variation documentation shall include the type of structure, height, length, discussion of alternatives, and costs.

3 LOADS

3.8 Wind Load

Delete the last paragraph and add the following:

The use of Appendix C is only permitted for the evaluation of existing structures.

C 3.8
FDOT *PPM*, Volume 1, Section 25.4.27 defines the structures where evaluation is necessary.

3.8.2 Basic Wind Speed

Delete the entire paragraph including Figure 3-2, and add the following:

The wind loads shall be based on the wind speeds (mph) shown in FDOT *SDG Table 2.4.1-2*

C 3.8.2
Add the following:
FDOT *SDG Table 2.4.1-2* was derived from the ASCE 7-05 wind speed map.

To simplify the design process, FDOT has designated one wind speed per county.

Table 2.4.1-2 Basic Wind Speed, V

County (Dist)	Basic Wind Speed (mph)	County (Dist)	Basic Wind Speed (mph)	County (Dist)	Basic Wind Speed (mph)
Alachua (2)	110	Hardee (1)	110	Okeechobee (1)	130
Baker (2)	110	Hendry (1)	130	Orange (5)	130
Bay (3)	130	Hernando (7)	130	Osceola (5)	130
Bradford (2)	110	Highlands (1)	130	Palm Beach (4)	150
Brevard (5)	130	Hillsborough (7)	130	Pasco (7)	130
Broward (4)	150	Holmes (3)	130	Pinellas (7)	130
Calhoun (3)	130	Indian River (4)	150	Polk (1)	110
Charlotte (1)	130	Jackson (3)	110	Putnam (2)	110
Citrus (7)	130	Jefferson (3)	110	St. Johns (2)	130
Clay (2)	110	Lafayette (2)	110	St. Lucie (4)	150
Collier (1)	150	Lake (5)	110	Santa Rosa (3)	150
Columbia (2)	110	Lee (1)	130	Sarasota (1)	130
DeSoto (1)	130	Leon (3)	110	Seminole (5)	130
Dixie (2)	130	Levy (2)	130	Sumter (5)	110
Duval (2)	130	Liberty (3)	130	Suwannee (2)	110
Escambia (3)	150	Madison (2)	110	Taylor (2)	130
Flagler (5)	130	Manatee (1)	130	Union (2)	110
Franklin (3)	130	Marion (5)	110	Volusia (5)	130
Gadsden (3)	110	Martin (4)	150	Wakulla (3)	130
Gilchrist (2)	110	Miami-Dade (6)	150	Walton (3)	130
Glades (1)	130	Monroe (6)	150	Washington (3)	130
Gulf (3)	130	Nassau (2)	130		
Hamilton (2)	110	Okaloosa (3)	130		

D. Velocity Pressure Exposure Coefficient, K_z

The velocity pressure exposure coefficient, K_z, shall be determined using the following equation:

$$K_z = 2.01(z/900)^{(0.2105)} \geq 0.85 \qquad \text{[Eq. 2-2]}$$

Where:

z = height to centroid of exposed area (ft)

3.0 Correspondence

Francis Haunstetter

From: Howard Holley
Sent: Wednesday, March 20, 2013 4:33 PM
To: Francis Haunstetter
Subject: RE: gulf dr. @ Marina
Attachments: Gulf Drive and Marina Drive - Signal Pole Report.pdf; MastTab MA-TAB (1).pdf; PLANSG01 Gulf-Marina (1).pdf

See Roadway and Geotechnical Information section For Files.

Frank,

See attached, let me know if you have any questions.....

Thanks,

Howard Holley
DESIGNER
CARDNO TBE
813-221-0043

From: Francis Haunstetter
Sent: Wednesday, March 06, 2013 11:54 AM
To: Bob Heck
Cc: Howard Holley; David Allen
Subject: RE: gulf dr. @ Marina

Hi Bob,

I followed up with Howard in Traffic Opps. They are waiting on the SUE and geotech work to be completed. They will be ready for us to do the mast arm design in 2 to 3 weeks, and are planning to submit 90% on or before April 4.

Francis X. Haunstetter, PE
STRUCTURES PROJECT MANAGER
CARDNO TBE
Direct (+1) 727.431.1615
Fax (+1) 727.532.9891

From: Bob Heck
Sent: Wednesday, March 06, 2013 11:18 AM
To: Francis Haunstetter
Subject: gulf dr. @ Marina

Frank what is the status of

Gulf Dr. @ Marina Dr. Signal **2- mast arms** Manatee County	00193-008-21 Frank		

Bob Heck, PE
DIRECTOR OF BRIDGE/STRUCTURES
CARDNO TBE

Cardno TBE
Shaping the Future

Phone (+1) 941-870-5739 Fax (+1) 941-377-1587 Mobile (+1) 727-638-3013
Address 22 Sarasota Center Blvd., Sarasota, Fl 34240
Email bob.heck@cardno.com Web www.cardno.com Web www.cardnotbe.com

---

From: Francis Haunstetter
Sent: Wednesday, March 06, 2013 11:14 AM
To: Jim Hunt
Cc: Bob Heck
Subject: FW: Breakwater Blvd. at US 19 Intersection Improvements - Hernando County

Hi Jim,

Please keep me informed and let me know when you when you need the structural design for the mast arms.

Thanks,

Francis X. Haunstetter, PE
STRUCTURES PROJECT MANAGER
CARDNO TBE
Direct (+1) 727.431.1615
Fax (+1) 727.532.9891

From: Bob Heck
Sent: Tuesday, March 05, 2013 11:52 AM
To: Jim Hunt; Francis Haunstetter
Subject: Re: Breakwater Blvd. at US 19 Intersection Improvements - Hernando County

You can just keep Frank involved.

----- Reply message -----
From: "Jim Hunt" <James.Hunt@cardno.com>
To: "Bob Heck" <Bob.Heck@cardno.com>
Subject: Breakwater Blvd. at US 19 Intersection Improvements - Hernando County
Date: Tue, Mar 5, 2013 8:55 am

New mast arms.

James W. Hunt, PE, AVS
SENIOR PROJECT MANAGER, TRANSPORTATION
CARDNO TBE

Cardno TBE
Shaping the Future

Phone (+1) (727) 531-3505 Fax (+1) (727) 532-9891 Direct (+1) (727) 431-1593 Mobile (+1) (727) 224-3727
Address 380 Park Place Boulevard, Suite 300, Clearwater, Florida 33759
Email james.hunt@cardno.com Web www.cardno.com Web www.cardnotbe.com

---

From: Bob Heck
Sent: Tuesday, March 05, 2013 8:27 AM
To: Jim Hunt
Subject: Re: Breakwater Blvd. at US 19 Intersection Improvements - Hernando County

Jim do we have structure on the project that I need to get emails?

----- Reply message -----
From: "Jim Hunt" <James.Hunt@cardno.com>
To: "Michael Ullven" <MUllven@co.hernando.fl.us>, "Mark Guttman" <MGuttman@co.hernando.fl.us>
Cc: "Peter Nikolov" <Peter.Nikolov@cardno.com>, "Mark Modjeski" <Mark.Modjeski@cardno.com>, "Larry Fluty" <Larry.Fluty@cardno.com>, "Deborah Hill" <Deborah.Hill@cardno.com>, "Jason Stanley" <Jason.Stanley@cardno.com>, "Hamid Faraji" <Hamid.Faraji@cardno.com>, "Tom Fulton" <Tom.Fulton@cardno.com>, "Ann Marie Summitt" <AnnMarie.Summitt@cardno.com>, "Chris Molander" <Chris.Molander@cardno.com>, "Bob Heck" <Bob.Heck@cardno.com>
Subject: Breakwater Blvd. at US 19 Intersection Improvements - Hernando County
Date: Tue, Mar 5, 2013 7:52 am

Michael,
We will submit the survey when it is completed.
Regards,

James W. Hunt, PE, AVS
SENIOR PROJECT MANAGER, TRANSPORTATION
CARDNO TBE

Cardno TBE
Shaping the Future

Phone (+1) (727) 531-3505 Fax (+1) (727) 532-9891 Direct (+1) (727) 431-1593 Mobile (+1) (727) 224-3727
Address 380 Park Place Boulevard, Suite 300, Clearwater, Florida 33759
Email james.hunt@cardno.com Web www.cardno.com Web www.cardnotbe.com

From: Michael Ullven [mailto:MUllven@co.hernando.fl.us]
Sent: Tuesday, March 05, 2013 7:29 AM
To: Jim Hunt; Mark Guttman
Cc: Peter Nikolov; Mark Modjeski; Larry Fluty; Deborah Hill; Jason Stanley; Hamid Faraji; Tom Fulton; Ann Marie Summitt; Chris Molander; Bob Heck
Subject: RE: Breakwater Blvd. at US 19 Intersection Improvements - Hernando County

Please submit a copy of the completed survey per the survey contract.
Thank you
Michael

From: Jim Hunt [mailto:James.Hunt@cardno.com]
Sent: Monday, March 04, 2013 4:17 PM
To: Michael Ullven; Mark Guttman
Cc: Peter Nikolov; Mark Modjeski; Larry Fluty; Deborah Hill; Jason Stanley; Hamid Faraji; Tom Fulton; Ann Marie Summitt; Chris Molander; Bob Heck
Subject: Breakwater Blvd. at US 19 Intersection Improvements - Hernando County

Michael and Mark,
Attached is our first progress report for the Breakwater Boulevard at US 19 Intersection Improvements project (Task No. 8 under our Continuing Traffic Engineering Services Agreement No. 08-038B). Let us know if you have any questions or comments.
Regards,

James W. Hunt, PE, AVS
SENIOR PROJECT MANAGER, TRANSPORTATION
CARDNO TBE

Cardno TBE
Shaping the Future

Phone (+1) (727) 531-3505 Fax (+1) (727) 532-9891 Direct (+1) (727) 431-1593 Mobile (+1) (727) 224-3727
Address 380 Park Place Boulevard, Suite 300, Clearwater, Florida 33759
Email james.hunt@cardno.com Web www.cardno.com Web www.cardnotbe.com

4.0 Roadway and Geotechnical Information

SPECIAL NOTES:

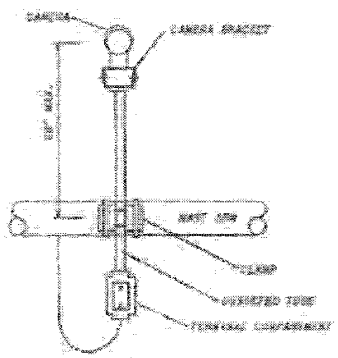
A. EACH POLE AND MAST ARM SHALL BE IDENTIFIED WITH A PERMANENT [illegible] WHICH BEARS THE POLE IDENTIFICATION NUMBER SHOWN ON THE PLANS.

B. ANCHOR BOLT COVERS (ORNAMENTAL, NON-ORNAMENTAL) [illegible] SHALL BE GALVANIZED STEEL OR CAST ALUMINUM AND SHALL BE SECURED BY A MINIMUM OF TWO (2) THREADED FASTENERS. THE BOLT COVERS SHALL BE OF SUFFICIENT SIZE SO THAT THERE IS NO GAP BETWEEN ITSELF AND THE POLE SHAFT.

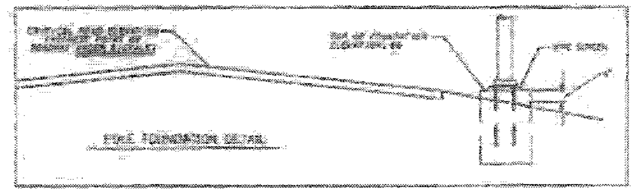
C. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY ALL ELEVATIONS LISTED HEREIN.

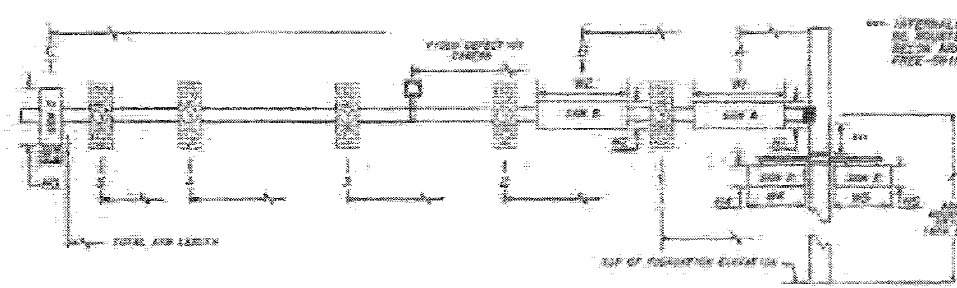
D. BACKPLATES REQUIRED FOR ALL SIGNALS HEADS.

E. CONTRACTOR SHALL COORDINATE WITH THE ENGINEER, IN CONJUNCTION WITH MANATEE COUNTY, FOR THE ACCEPTABLE AND COMPATIBLE VIDEO DETECTION BRACKET TO USE.



CAMERA MOUNTING DETAIL
(CONTACT MANATEE COUNTY FOR MOUNTING PREFERENCES.)





*** INTERNALLY ILLUMINATED SIGNS "D" AND "E" SHALL BE MOUNTED FREE-SWINGING [illegible]. POLE #1 HAS TWO FREE-SWINGING STREET NAME SIGNS.

\# DENOTES NUMBER OF SECTIONS IN SIGNAL HEAD ASSEMBLY

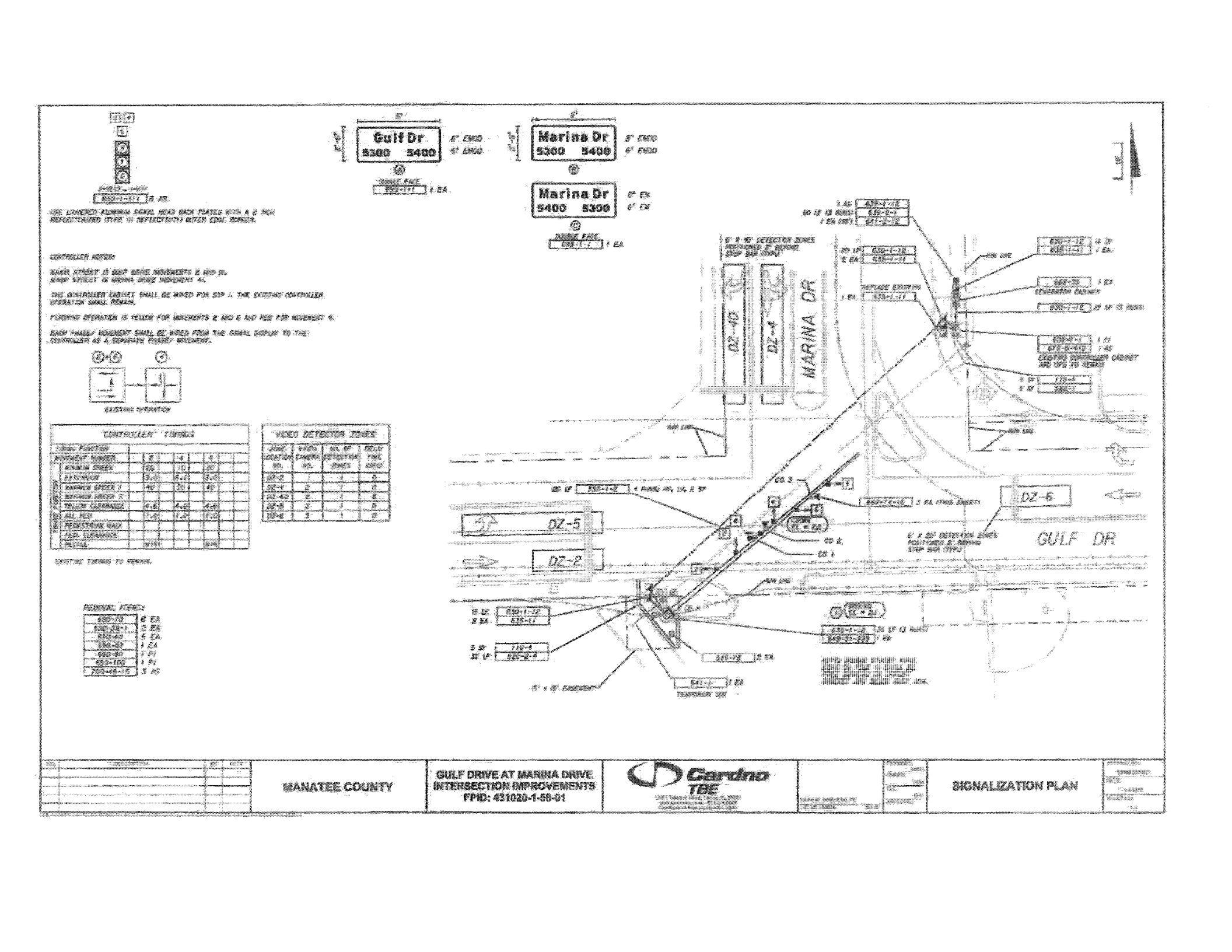
STRUCT. NO.	POLE ID NO.	SHEET NO.	LOCATION OF SIG.	CRITICAL ROAD EL.	FOUNDATION	TOP OF FOUNDATION ELEVATION	SIGNAL ARM NO.	SIGNAL TYPE	BACK PLATES Y/N	POLE SIGNAL Y/N	1	#	2	#	3	#	4	#	5	#	6	#	7	#	8	#	TOTAL ARM LENGTH	ARM ANG.	∠ BETWEEN	A	H1	W1	B	H2	W2	C	H3	W3	D/E	H4	W4	H5	W5	1	2	3	Y/N	LUM ROTATION	LUM WATTS
–	1	T-8	–	[illegible]	[illegible]	[illegible]	A	[illegible]	Y	N	6.5'	3	25'	3	30'	3	32'	3	40'	3	58'	3					70.5	[illegible]	–	–	–	–	–	–	–	–	–	–	N/A	2.5'	6'	2.5'	6'	33'	38'	52'	N	–	–
							B	[illegible]	Y	N																																							

*** THE TABLE BELOW IS FOR DESIGN PURPOSES ONLY! THE CONTRACTOR SHALL NOT USE INFORMATION BELOW IN PLACEMENT OF THE SIGNALS AND/OR SIGNS. SEE INFORMATION IN THE TABLE LOCATED ABOVE FOR ACTUAL SIGNAL INSTALLATION.

\# DENOTES NUMBER OF SECTIONS IN SIGNAL HEAD ASSEMBLY

STRUCT. NO.	POLE ID NO.	SHEET NO.	LOCATION OF SIG.	CRITICAL ROAD EL.	FOUNDATION	TOP OF FOUNDATION ELEVATION	SIGNAL ARM NO.	SIGNAL TYPE	BACK PLATES Y/N	POLE SIGNAL Y/N	1	#	2	#	3	#	4	#	5	#	6	#	7	#	8	#	TOTAL ARM LENGTH	ARM ANG.	∠ BETWEEN	A	H1	W1	B	H2	W2	C	H3	W3	D/E	H4	W4	H5	W5	1	2	3	Y/N	LUM ROTATION	LUM WATTS
–	1	T-8	–	[illegible]	[illegible]	[illegible]	A	[illegible]	Y	N	6.5'	3	25'	3	30'	3	32'	3	40'	3	58'	3					70.5	[illegible]	–	–	–	–	–	–	–	54'	3'	3'	N/A	2.5'	6'	2.5'	6'	33'	38'	52'	N	–	–
							B	[illegible]	Y	N																																							

MANATEE COUNTY	GULF DRIVE AT MARINA DRIVE INTERSECTION IMPROVEMENTS FPID: 431020-1-58-01	Cardno TBE	MAST ARM TABULATION AND CALCULATION CONFIGURATION


Gulf Dr
5300 5400
Marina Dr
5300 5400
Marina Dr
5400 5300
MARINA DR
GULF DR
DZ-40
DZ-4
DZ-5
DZ-2
DZ-6
CONTROLLER TIMING
VIDEO DETECTOR ZONES
REMOVAL ITEMS
MANATEE COUNTY
GULF DRIVE AT MARINA DRIVE
INTERSECTION IMPROVEMENTS
FPID: 431020-1-58-01
Cardno TBE
SIGNALIZATION PLAN

GEOTECHNICAL ENGINEERING SERVICES
GULF DRIVE & MARINA DRIVE – SIGNAL POLE
ANNA MARIA ISLAND, FLORIDA

Date: March 20, 2013

Prepared For:

Cardno TBE
12481 Telecom Drive
Tampa, Florida 33637

Prepared By:

Dunkelberger Engineering and Testing, Inc.
8260 Vico Court, Unit B
Sarasota, Florida 34240

Project No.: SAR-12-1493

Cardno TBE
12481 Telecom Drive
Tampa, Florida 33637

March 20, 2013
Project No.: SAR-12-1493

Attention: Mr. Howard Holley
Designer

Subject: **Geotechnical Engineering Services**
Gulf Drive & Marina Drive – Signal Pole
Anna Maria Island, Florida

Dear Mr. Holley:

INTRODUCTION

In accordance with Dunkelberger Engineering & Testing, Inc. (DUNKELBERGER) Proposal No. SAR-12-1493, dated September 12, 2012, which was authorized by a subcontract agreement on March 8, 2013, we have completed geotechnical engineering services in connection with the above referenced project.

PROJECT CONSIDERATIONS

We understand that a new signal pole structure is to be installed at the southwest corner of the Gulf Drive and Marina Drive intersection on Anna Maria Island in Manatee County, Florida.

If the actual project considerations vary from our present understandings, then we should be advised to allow re-evaluation of the opinions, recommendations and conclusions presented in this report.

SURFICIAL SOIL CONDITIONS

The Soil Survey of Manatee County, Florida (i.e. Soil Survey), issued April, 1983 and published by the Soil Conservation Service (U.S. Department of Agriculture), was reviewed to determine the surficial soil map units at this site. The soil survey indicates that the project is mapped with Soil Unit 32. Unit 32, Myakka fine sand, shell substratum, is comprised of nearly-level, poorly drained fine sand to a depth of 80 inches that is mixed with shells and shell fragments. Under natural (pre-development) conditions, the Seasonal High Groundwater Table (SHGWT) is reported to lie at a depth of less than 10 inches below land surface (bls) for 1 to 4 months of the year.

SUBSURFACE CONDITIONS

Field Exploration

The subsurface conditions of the site were explored with one (1) Standard Penetration Test (SPT) boring drilled to a depth of 25 feet. The SPT boring was drilled by a truck-mounted Central Mine Equipment Model 55 (CME 55) drill rig using mud rotary procedures and SPT methodology, per ASTM D-1586, for the collection of soil samples. Representative portions of the recovered soil samples were collected in labeled glass jars and transported to our laboratory for visual-manual classification by a geotechnical engineer.

The groundwater level was measured in the boring just prior to it being backfilled with cement grout and patched with asphalt.

The location of the boring is indicated on the attached *Report of Core Boring for a Signal Pole* drawing included as Sheet 1 of this report.

SPT Boring Findings

The SPT boring found medium dense to dense fine sand with trace to slight amounts of silt (SP, SP-SM; Stratum 1) from the ground surface to a depth of about 18 feet bls, and underlain by very loose silty fine sand (SM; Stratum 2) to the borehole termination depth of 25 feet bls.

The boring results, including soil stratigraphy and classifications, SPT blow count data (N-Values), results of laboratory testing, and groundwater level are summarized on the *Report of Core Boring for a Signal Pole* included as Sheet 1. This attachment should be consulted for specific details of the boring.

Groundwater

Groundwater level measured during drilling for this study, in March 2013, was at about 2 ½ feet bls. The groundwater measurements are influenced by the drilling process, existing site drainage features, and ambient weather conditions, which have been seasonally dry. In general terms, the groundwater level should be assumed as shallow for both design and construction purposes.

LABORATORY ANALYSIS

Soil samples collected from the borings were reviewed in our laboratory by a geotechnical engineer and assigned a visual-manual classification per the Unified Soil Classification System (U.S.C.S.). Also, two (2) samples were selected for testing to aid in the U.S.C.S classification. Two (2) moisture content tests and two (2) percent finer than the U.S. No. 200 sieve tests were run. The results of the lab testing are shown on the *Report of Core Boring for a Signal Pole* on the attached Sheet 1.

RECOMMENDATIONS

The table on Sheet 1 presents design parameters for the different soil strata encountered at the boring locations. It is our understanding that the pole foundations will be a drilled shaft system designed by others. The pole foundations should be designed using the soil parameters provided on Sheet 1.

LIMITATIONS OF STUDY

DUNKELBERGER warrants that the findings, recommendations, specifications, or professional advice contained herein have been made in accordance with generally accepted professional geotechnical engineering practices in the local area. No other warranties are implied or expressed.

The scope of services did not include an environmental assessment for determining the presence or absence of wetlands or hazardous or toxic materials in the soil, bedrock, surface water, groundwater, or air, on or below or around this site. Any statements in this report or on the boring profiles regarding odors, colors, unusual or suspicious items or conditions are strictly for the information of the client. Additionally our scope of services did not include any investigation into the potential for ground subsidence due to the presence of sinkhole activity.

The analysis and recommendations submitted in this report are based upon the data obtained from the soil borings performed at the locations indicated. If any subsoil variations become evident during the course of the project, a re-evaluation of the recommendations contained in this report will be necessary after we have had an opportunity to observe the characteristics of the conditions encountered. The applicability of the report should also be reviewed in the event significant changes occur in the design, nature or location of the assumed structures.

This report has been prepared for the exclusive use of Cardno TBE for the specific application to the new signal pole at the intersection of Gulf Drive and Marina Drive in Manatee County, Florida.

oOo

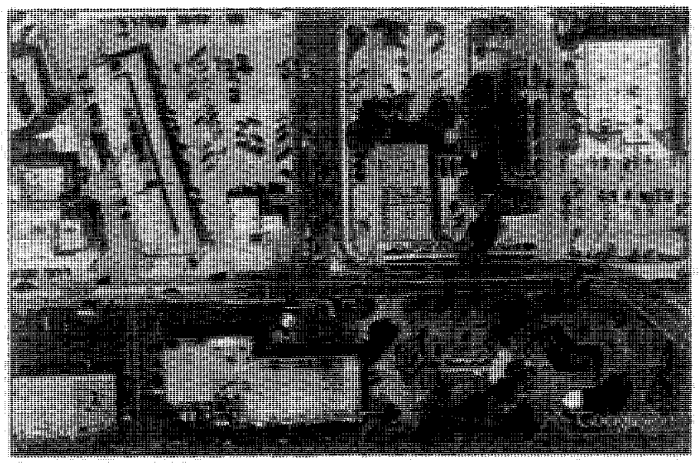
We appreciate the opportunity to be of service during this phase of the project. If you have any questions, please contact the undersigned at 941-379-0621.

Sincerely,
DUNKELBERGER ENGINEERING & TESTING, INC.

Russell O. Blakely III
Russell O. Blakely III, E.I.
Staff Engineer 3/21/13

Scott Parrish
Scott N. Parrish, P.E.
Branch Manager 3/20/13
FL License No.: 69091

Attachments: Sheet 1 – Report of Core Boring for a Signal Pole

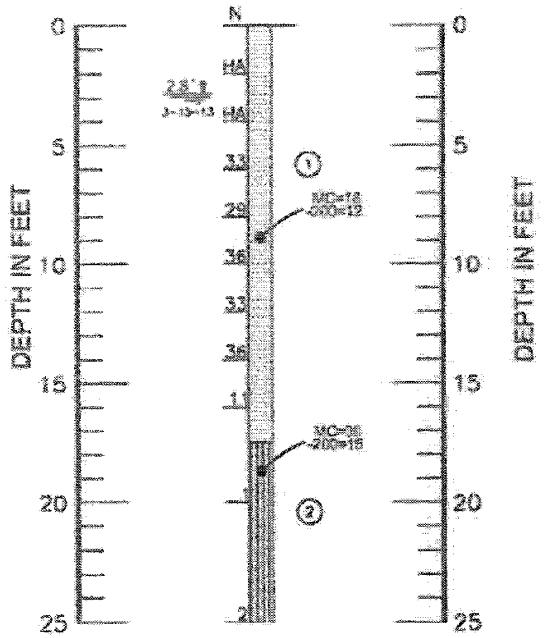


SOURCE: GOOGLE EARTH

0' 75' 150' 300'

● B-1 - STANDARD PENETRATION TEST BORING LOCATION AND NUMBER

BORING NO. B-1



GENERAL LEGEND

① Light gray to dark brown fine SAND, with trace silt to slightly silty, sometimes with shell (SP, SP-SM)

② Dark gray silty fine SAND, with shell fragments (SM)

N – Indicates the number of blows of a 140 pound hammer, freely falling a distance of 30 inches, required to drive a 2-inch diameter sampler 12 inches (ASTM D 1586)

-200 – Amount Passing U.S. Standard No. 200 Sieve (%)

MC – Moisture Content (%)

HA – Hand auger 4 feet in order to avoid possible conflict with underground utilities

B-1 – Standard Penetration Test (SPT) Boring and number

SP – Unified Soil Classification System Group Symbol (ASTM D 2487)

2.8 ▼ 3-19-13 – Depth of groundwater (feet) & date measured

NOTES

(1) Borings were drilled on March 19, 2013 using a Central Mine Equipment Model 55 (CME 55) drill rig.

(2) Strata boundaries are approximate and represent soil strata at each test hole location only. Soil transitions may be more gradual than implied.

(3) Groundwater depths shown on the soil profiles represent groundwater depths on the dates shown. Groundwater level fluctuations should be anticipated throughout the year.

STANDARD PENETRATION TEST DATA

SPOON INSIDE DIA.	1.375 inch
SPOON OUTSIDE DIA.	2.00 inches
AVG. HAMMER DROP	30 inches
HAMMER WEIGHT	140 pounds

SUMMARY OF FOUNDATION DESIGN PARAMETERS

Boring No.	Depth (feet)	Range of SPT - N	Unit Weights (PCF) Moist	Submerged	Angle of Internal Friction (degrees)	Effective Cohesion (psf)	Earth Pressure Coefficients Ka	Kp
B-1	0-17	11-36	110	50	32	0	0.307	3.25
	17-25	1-2	110	50	26	0	0.391	2.77

SPT DENSITY CHART

GRANULAR MATERIALS - RELATIVE DENSITY	SPT (BLOWS/FOOT)
VERY LOOSE	LESS THAN 4
LOOSE	4 - 10
MEDIUM	10 - 30
DENSE	30 - 50
VERY DENSE	GREATER THAN 50

DUNKELBERGER engineering & testing, inc.

REPORT OF CORE BORING FOR A SIGNAL POLE

GULF DRIVE & MANATEE DRIVE - SIGNAL POLE MANATEE COUNTY, FLORIDA

SHEET NO. 1

5.0 Mast Arm Design

Cardno TBE

Mast Arm Design Methodology

Cardno TBE utilizes the following methodology in design of mast arm signal structures. First, an Excel spreadsheet is used to compare the proposed signal loadings to the standard mast arm loadings as shown in the FDOT Instructions for Design Standards, Index 17743. If future signal loadings are included with the proposed loadings, then these loadings are also compared to the standard mast arm loadings.

The signals and signs are then shifted to account for field adjustments due to possible unknown buried structures. A second Excel spreadsheet is used to compare the shifted signal loadings to the standard loadings.

The controlling signal loadings are selected from the two spreadsheets and standard mast arms are selected that meet the required arm lengths and that are adequate to resist the controlling loadings. The FDOT Mast Arm Analysis Program is then used to calculate the required drilled shaft depth for the selected standard mast arms and the controlling soil properties provided by the geotechnical engineer.

If the controlling signal loading is greater than the standard mast arms available for the design wind load, then the FDOT Mast Arm Analysis Program will be used to determine if a stronger standard mast arm for a higher design wind load can be used. For instance, if a 78 foot long mast arm is required for a design wind load of 130 mph, and the E7-T6 standard mast arm is inadequate to support the controlling loading, then the FDOT Mast Arm Analysis Program will be used to check the D7-S6 mast arm for the 130 mph wind load instead of the 150 mph design wind load normally associated with this mast arm.

If none of the stronger standard mast arms are adequate to support the controlling signal loading, then the FDOT Mast Arm Analysis Program will be used to design a special mast arm. The closest standard mast arm will be used as a starting point, and the mast arm will be modified as needed to support the loading conditions.

An Excel spreadsheet is used to calculate the arm mounting height. The minimum vertical clearance over the roadway is 17.5 feet per the FDOT Plans Preparation Manual, Table 2.10.3. The maximum vertical clearance is 19.0 feet per the 2002 FDOT Index 1740, sheet 2 of 2. Although this index is no longer a current design standard, 19.0 feet represents a desirable upper limit so that the signals are clearly visible to drivers approaching the intersection. It is Cardno TBE's intent to set the vertical clearance as close as practical to 18.25 feet, which is halfway between these minimum and maximum clearances.

Once the mounting height has been determined, an Excel spreadsheet is used to calculate the length and tip diameter for the arm and upright. After all the design steps have been completed, the information necessary to fabricate the mast arm is provided in the Table of Variables for Standard Mast Arm Assemblies or the Table of Variables for Special Mast Arm Assemblies, as appropriate.

Project **Gulf Drive and Marina Drive Signal Mast Arms**
Cardno TBE Project No. 00193-008-21
Subject **Determine AREA x DISTANCE values for project**

Calcs **FXH** Date **21-Mar-13**

FDOT PPM Vol. 1, Fig. 29.2 Loading Trees

	SIGNAL DATA (Area per Signal Section 1,260 ft²)										SIGN DATA								
	Signal 1		Signal 2		Signal 3		Signal 4		Signal 5		Signal AxD	Sign 1			Sign 2			Sign AxD	Total Area x Distance
	Dist [ft]	# Sect [ea]	Dist [ft]	# Sect [ea]	Dist [ft]	# Sect [ea]	Dist [ft]	# Sect [ea]	Dist [ft]	# Sect [ea]	[ft² - ft]	Dist [ft]	H [ft]	W [ft]	Dist [ft]	H [ft]	W [ft]	[ft² - ft]	[ft² - ft]
D1, D2, E1, E2	17.00	3	26.00	3	33.00	3					288.56	8.00	1.50	10.00				120.00	408.56
D3, D4, E3, E4	19.80	3	29.17	3	37.17	5					419.98	23.17	1.50	6.00	42.58	2.00	3.00	463.98	883.96
D5, E5	21.00	3	29.00	3	40.00	3	52.00	5			670.78	35.00	1.50	5.00	44.00	2.00	2.50	535.00	1205.78
D6, E6	20.00	3	32.00	3	44.25	3	56.25	3	67.33	3	834.68	38.08	1.50	6.00	62.25	2.00	2.50	654.00	1488.68
D7, E7	38.00	3	53.00	3	68.00	3	76.00	3			892.27	29.00	1.50	10.00				435.00	1327.27

Mast Arms for project

				SIGNAL DATA (Area per Signal Section 1,260 ft²)												
				Signal 1		Signal 2		Signal 3		Signal 4		Signal 5		Signal 6		Signal AxD
ID No.	Location	Pole	Arm	Dist [ft]	# Sect [ea]	Dist [ft]	# Sect [ea]	Dist [ft]	# Sect [ea]	Dist [ft]	# Sect [ea]	Dist [ft]	# Sect [ea]	Dist [ft]	# Sect [ea]	[ft² - ft]
T-5	1	1	1	19.50	3	26.00	3	36.00	3	39.00	3	46.00	3	58.00	3	848.60
T-5 (future)	1	1	1	19.50	3	26.00	3	36.00	3	39.00	3	46.00	3	58.00	3	848.60

Mast Arms for project

				SIGN DATA															Total
				Sign 1			Sign 2			Sign 3			Sign 4			Sign 5			Sign AxD	Area x Distance	Arm Length
ID No.	Location	Pole	Arm	Dist [ft]	H [ft]	W [ft]	Dist [ft]	H [ft]	W [ft]	Dist [ft]	H [ft]	W [ft]	Dist [ft]	H [ft]	W [ft]	Dist [ft]	H [ft]	W [ft]	[ft² - ft]	[ft² - ft]	[ft]
T-5	1	1	1				33.00	1.25	1.25	38.00	1.25	1.25	62.00	1.25	1.25				192.19	1040.79	70.50
T-5 (future)	1	1	1	84.00	3.00	3.00	33.00	1.25	1.25	38.00	1.25	1.25	62.00	1.25	1.25				768.19	1616.79	70.50

Mast Arms

ID No.	Location	Pole	Arm	Applied Area x Distance [ft² - ft]	Applied Arm Length [ft]	Design Arm Type	Design Area x Distance [ft² - ft]	Design Arm Length [ft]	Is Design > Applied AxD ?	% Design Capacity	Is Design > Applied Length ?
T-5	1	1	1	1040.79	70.5	E6	1488.68	70.50	TRUE	69.9%	TRUE
T-5 (future)	1	1	1	1616.79	70.5	E6	1488.68	70.50	FALSE	108.6%	TRUE

To account for possible field adjustments, shift signals and signs so that the last one is 2 feet from the end of the arm. Then recheck % Design Capacity. <—

Notes :

1. "Area per Signal Section" is the projected area for a single signal section, and does not include backplates.
2. Video detection equipment modeled as an 1.25 x 1.25 foot sign.
3. If the "AreaxDistance" value exceeds the value computed for the standard loading tree, check the design using the MathCAD mast arm design templates.

LEGEND	
33.00	Input
550.55	Results

Project **Gulf Drive and Marina Drive Signal Mast Arms** *Calcs* **FXH** *Date* **21-Mar-13**

Cardno TBE Project No. 00193-008-21

Subject **Determine AREA x DISTANCE values for project**

To account for possible field adjustments, shift signals and signs so that the last one is 2 feet from the end of the arm.

SIGNAL DATA *Area per Signal Section* 1.266 ft²

SIGN DATA

FDOT PPM Vol. 1, Fig. 29.2 Loading Trees	Signal 1 Dist [ft]	Signal 1 # Sect [ea]	Signal 2 Dist [ft]	Signal 2 # Sect [ea]	Signal 3 Dist [ft]	Signal 3 # Sect [ea]	Signal 4 Dist [ft]	Signal 4 # Sect [ea]	Signal 5 Dist [ft]	Signal 5 # Sect [ea]	Signal AxD [ft² · ft]	Sign 1 Dist [ft]	Sign 1 H [ft]	Sign 1 W [ft]	Sign 2 Dist [ft]	Sign 2 H [ft]	Sign 2 W [ft]	Sign AxD [ft² · ft]	Total Area x Distance [ft³ · ft]	Arm Length [ft]
D1, D2, E1, E2	17.00	3	26.00	3	33.00	3					288.56	8.00	1.50	10.00				120.00	408.56	36.0
D3, D4, E3, E4	19.50	3	29.17	3	37.17	5					419.98	23.17	1.50	6.00	42.53	2.00	3.00	463.98	883.96	46.0
D5, E5	21.00	3	29.00	3	40.00	3	52.00	5			670.78	35.50	1.50	6.00	44.00	2.00	2.50	535.00	1205.78	60.0
D6, E6	20.00	3	32.00	3	44.25	3	56.25	3	67.33	3	834.68	38.08	1.50	6.00	52.25	2.00	2.50	654.00	1488.68	70.5
D7, E7	38.00	3	53.00	3	68.00	3	76.00	3			892.27	29.00	1.50	10.00				435.00	1327.27	78.0

Mast Arms for project

SIGNAL DATA *Area per Signal Section* 1.266 ft²

ID No.	Location	Pole	Arm	Signal 1 Dist [ft]	Signal 1 # Sect [ea]	Signal 2 Dist [ft]	Signal 2 # Sect [ea]	Signal 3 Dist [ft]	Signal 3 # Sect [ea]	Signal 4 Dist [ft]	Signal 4 # Sect [ea]	Signal 5 Dist [ft]	Signal 5 # Sect [ea]	Signal 6 Dist [ft]	Signal 6 # Sect [ea]	Signal AxD [ft² · ft]	
T-5	1	1	1	90.00	3	35.50	3	48.50	3	49.50	3	56.50	3	68.50	3	1087.80	Add 70.5 - 2 - 56 = 10.5 ft
T-5 (future)	1	1	1	24.00	3	29.50	3	40.50	3	43.50	3	50.50	3	62.50	3	951.12	Add 70.5 - 2 - 64 = 4.5 ft

Mast Arms for project

SIGN DATA

ID No.	Location	Pole	Arm	Sign 1 Dist [ft]	Sign 1 H [ft]	Sign 1 W [ft]	Sign 2 Dist [ft]	Sign 2 H [ft]	Sign 2 W [ft]	Sign 3 Dist [ft]	Sign 3 H [ft]	Sign 3 W [ft]	Sign 4 Dist [ft]	Sign 4 H [ft]	Sign 4 W [ft]	Sign 5 Dist [ft]	Sign 5 H [ft]	Sign 5 W [ft]	Sign AxD [ft² · ft]	Total Area x Distance [ft³ · ft]	Arm Length [ft]
T-5	1	1	1				43.50	1.25	1.25	48.50	1.25	1.25	62.50	1.25	1.25				241.41	1329.21	70.50
T-5 (future)	1	1	1	68.50	3.00	3.00	37.50	1.25	1.25	42.50	1.25	1.25	56.50	1.25	1.25				829.78	1780.90	70.50

Mast Arms ID No.	Location	Pole	Arm	Applied Area x Distance [ft² · ft]	Applied Arm Length [ft]	Design Arm Type	Design Area x Distance [ft² · ft]	Design Arm Length [ft]	Is Design > Applied AxD ?	% Design Capacity	Is Design > Applied Length ?	
T-5	1	1	1	1329.21	70.5	E5	1488.68	70.50	TRUE	89.3%	TRUE	
T-5 (future)	1	1	1	1780.90	70.5	E6	1488.68	70.50	FALSE	119.6%	TRUE	<— Based on this program the E6-T4 and E7-T6 mast arms are both overstressed; however, the D6-S4 mast arm with a 130 mph wind load is adequate to handle the controlling loading.

Use FDOT mast arm program to check mast arms for controling loading (119.6% of E6-T4 design capacity).

LEGEND: 33.00 Input; 550.56 Results

Notes :

1. "Area per Signal Section" is the projected area for a single signal section, and does not include backplates.
2. Video detection equipment modeled as an 1.25 x 1.25 foot sign.
3. If the "AreaxDistance" value exceeds the value computed for the standard loading tree, check the design using the MathCAD mast arm design templates.

Project **Gulf Drive and Marina Drive Signal Mast Arms**
Cardno TBE Project No. 00195-008-21

Calcs **FXH** *Date* **21-Mar-13**

Subject **Determine arm mounting height for mast arms.**

Max. Vertical Clearance 19.00 ft
Min. Vertical Clearance 17.50 ft

Desired Vertical Clearance 18.25 ft

Bolt Dia. (BC) for leveling pad

(in)	(ft)
1.50	0.125
1.75	0.146
2.00	0.167
2.25	0.188

DATA

LOCATION	POLE
T-5	DS-S4

ARM ONE						
ELEV @ RDWY CROWN	ELEV @ TOP OF FOUNDATION	DIFFERENCE FOUNDATION TO CROWN	GROUT OR LEVELING PAD	VERT. CLR.	O/S TO CL SIGNAL	ARM HEIGHT DIM "UB"
2.6	2.60	0.00	0.167	18.25	2.00	20.083

Not used for single mast arms.

ARM TWO						
ELEV @ RDWY CROWN	ELEV @ TOP OF FOUNDATION	DIFFERENCE FOUNDATION TO CROWN	GROUT OR LEVELING PAD	VERT. CLR.	O/S TO CL SIGNAL	ARM HEIGHT DIM "UB"
0.00	0.00	0.00	0.167	18.25	2.00	0.000

RESULTS

LOCATION	POLE
T-5	DS-S4

CALC'D HEIGHT (MAX)	USE HT. FOR DIM. "UB"	CHANGE IN HT.	VERT. CLR.	CHECK LIMITS
20.083	20.000	-0.083	18.17	OK

Not used for single mast arms.

CALC'D HEIGHT (MIN)	USE HT. FOR DIM. "UB"	CHANGE IN HT.	VERT. CLR.	CHECK LIMITS
0.000	0.000	0.000	18.25	OK

Notes :

For "O/S to CL Signal" use 2.0 ft. for vertically mounted signals and 1.5 ft for horizontally mounted signals
Refer to FDOT PPM §2.10 and Table 2.10.3 for minimum vertical clearance.
Refer to 2002 FDOT Standard Index 17740 sheet 2 of 2 for maximum vertical clearance.

Project **Gulf Drive and Marina Drive Signal Mast Arms** *Calcs* **FXH**
Cardno TBE Project No. 00193-008-21 *Date* **21-Mar-13**
Subject **Determine tip diameters for the arms and poles.**

from FDOT Standard Index 17743

standard taper rate -0.140 ft/ft

Mast Arm	*Arm L (ft)*	*FA(ft)*	*FC(in)*
D1	36	36	14
D2	36	36	14
D3	46	36.3	14
D4	46	36.3	14
D5	60	36	13
D6	70.5	39.4	15
D7	78	40	14
E1	36	36	11
E2	36	36	11
E3	46	36.3	12.14
E4	46	36.3	12.14
E5	60	36	11.14
E6	70.5	39.4	12.15
E7	78	40	13.1
F1	36	36	11
F2	36	36	11
F3	46	36.3	11
F4	46	36.3	11
F5	60	36	11
F6	70.5	39.4	11
F7	78	40	12
NA	0	0	0
999	999	999	999

Pole	*UA(ft)*	*UD(ft)*
S1	24	16
S2	24	18
S21	39	16
S22	39	18
S23	39	21
S24	39	26
S3	24	21
S4	24	26
S5	24	27
S6	24	25
T1	24	14
T2	24	16
T21	39	14
T22	39	16
T23	39	19
T24	39	22
T3	24	19
T4	24	22
T5	24	22
T6	24	22
W1	24	13
W2	24	15
W21	39	13
W22	39	15
W23	39	18
W24	39	21
W3	24	18
W4	24	21
W5	24	21
W6	24	21
NA	0	0
999	999	999

Location T-5

first arm type	D6		**second arm type**	NA		**upright type**	S4	
new arm length	70.50	ft	new arm length	0.00	ft	mounting ht. UB	20.00	ft
std arm length	70.50	ft	std arm length	0.00	ft	new upright ht. UAA	21.50	ft
std base diametre	15	in	std base diametre	0	in	std upright height	24.00	ft
new arm len. FAA	39.400		new arm len. FAA	0.000	ft	std base diametre	26	in
new tip diam. FBA	9.484		new tip diam. FBA	0.000	in	new tip diam. UCA	22.990	in

Mast Arm T-5

FDOT Mast Arm Analysis Program

Custom File Name (optional)

The new custom file will be a copy of the last file called from the program. A 'dat' extension will be added to the file name.

Add file to file list Refresh File List

Select Data File (required)

D6S4
D7S6
E6T4
E7T6

All data files are in the same directory as the MastArm.xmcd file.

Path = "J:\00193\00193008.21\DOC\Calcs\Mast_Arm_Design\MastarmV5

DataFile = "D6S4.dat"

Reference *Changes*

This program works in conjunction with Mastarm Design Standards 17743 and 17745.

References:
AASHTO Standard Specifications for Signs, Luminaires and Traffic Signals, 5th Edition (LTS).
FDOT Structures Manual Vol. 9 (SM V9).

For more information see Reference.xmcd and Changes.xmcd.

Read In Data

General Information DataFile = "D6S4.dat"

Current Values	New Values
Subject = "D6-S4 Mast Arm"	
ProjectNo = "Design Standard"	
PoleLocation = "Index 17743"	
Date = "01/01/11"	
DesignedBy = "FDOT"	
CheckedBy = "FDOT"	

Due to the loading, use the stronger D6-S4 mast arm with a 130 mph wind load for mast arm T-5.

Use Control+F9 to recalculate the worksheet, once to write out data, twice to read in data

Wind Speed DataFile = "D6S4.dat"

Current Value	New Value		
WindSpeed = 130 mph	130	*mph*	SM V9 3.8.2

Arm 1 Analysis

DataFile = "D6S4.dat" WindSpeed = 130·mph

Arm 1 Loads

$$SignalData_{arm1} = \begin{pmatrix} \text{"SignalNumber"} & \text{"DistanceToSignal(ft)"} & \text{"NumberOfSignalHeads"} & \text{"BackPlate"} \\ 1 & 24 & 3 & \text{"yes"} \\ 2 & 29.5 & 3 & \text{"yes"} \\ 3 & 40.5 & 3 & \text{"yes"} \\ 4 & 43.5 & 3 & \text{"yes"} \\ 5 & 50.5 & 3 & \text{"yes"} \\ 6 & 62.5 & 3 & \text{"yes"} \\ 7 & 68.5 & 3 & \text{"no"} \\ 8 & 0 & 0 & \text{"yes"} \\ 9 & 0 & 0 & \text{"yes"} \\ 10 & 0 & 0 & \text{"yes"} \end{pmatrix}$$

use X to zero out data
use 0 to keep current values *"yes" or "no"*

New Values

"SignalNumber"	"DistToSignal(ft)"	"#SignalHeads"	"BackPlate"
1	24	3	"yes"
2	29.5	3	"yes"
3	40.5	3	"yes"
4	43.5	3	"yes"
5	50.5	3	"yes"
6	62.5	3	"yes"
7	68.5	3	"no"
8	0	0	"yes"
9	0	0	"yes"
10	0	0	"yes"

3 sectioned signal with no backplates added at 68.5 ft to model a dampening device.

$$SignData_{arm1} = \begin{pmatrix} \text{"PanelNumber"} & \text{"DistanceToPanelCentroid(ft)"} & \text{"PanelArea(sf)"} \\ 1 & 68.5 & 9 \\ 2 & 37.5 & 1.56 \\ 3 & 42.5 & 1.56 \\ 4 & 56.5 & 1.56 \\ 5 & 0 & 0 \end{pmatrix}$$

New Values

"Panel#"	"DistToCentroid(ft)"	"PanelArea(sf)"
1	68.5	9
2	37.5	1.56
3	42.5	1.56
4	56.5	1.56
5	0	0

use X to zero out data
use 0 to keep current values

Video detection equipment modeled as 1.25 ft by 1.25 signs.

Arm 1 Loads

Arm 1 Properties

Current Values

New Values

$L_{total.arm1} = 70.5\,ft$ — *feet, 40 ft. max. for 1 piece arms*

$Diameter_{base.arm1} = 19 \cdot in$ — *inches, measured flat to flat (FG)*

$Dist_{splice.from.base.arm1} = 33.1\,ft$ — *feet, splice distance, for 2 piece arms, length of piece closest to pole, use X to zero out (FE)*

set $Dist_{splice.from.base.arm1} = 0ft$ *for NO SPLICE*

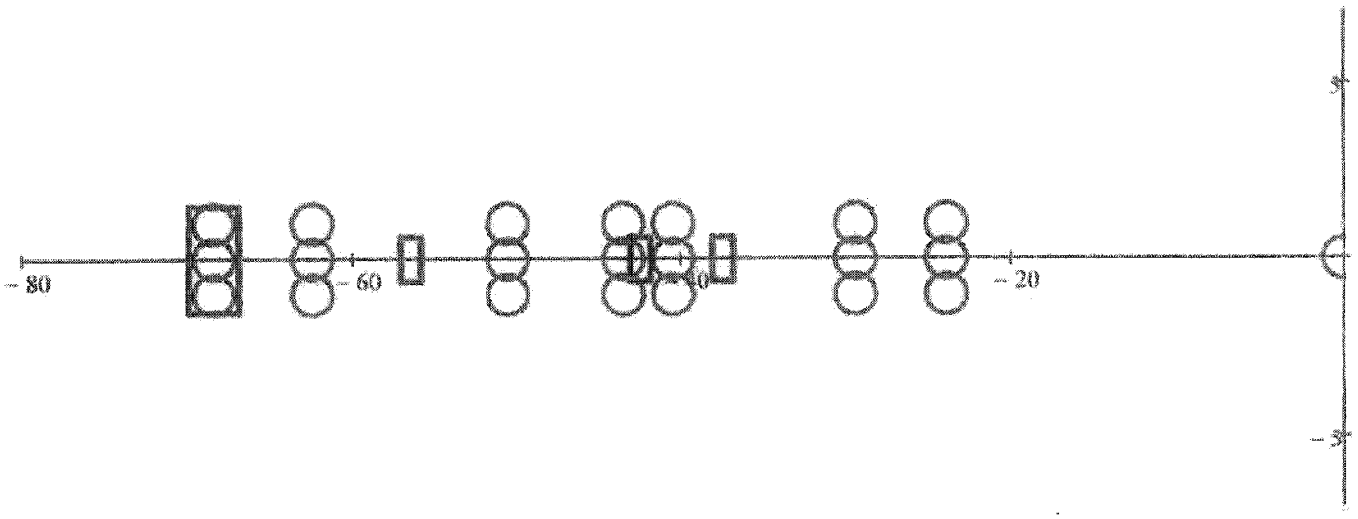
$t_{wall.arm1} = \begin{pmatrix} 0.1793 \\ 0.375 \end{pmatrix} \cdot in$ — *inches, this value is used for one piece arms (FD)*

inches, for 2 piece arms, wall thickness of piece closest to the pole, use X to zero out (FH)

Arm 1 Properties

Analyze Arm 1

Summary - Arm 1 Geometry and Loading



Location of Signs and Signals

$WindSpeed = 130 \cdot mph$ $L_{total.arm1} = 70.50\,ft$

$Diameter_{tip.arm1} = \begin{pmatrix} 9.49 \\ 14.37 \end{pmatrix} \cdot in$ $Diameter_{base.arm1} = \begin{pmatrix} 15.00 \\ 19.00 \end{pmatrix} \cdot in$ $L_{arm1} = \begin{pmatrix} 39.40 \\ 33.10 \end{pmatrix} ft$ $t_{wall.arm1} = \begin{pmatrix} 0.1793 \\ 0.375 \end{pmatrix} \cdot in$

$X_{signal.arm1_{ll}} =$

24 ft
29.5
40.5
43.5
50.5
62.5

$Sections_{signal.arm1_{ll}} =$

3
3
3
3
3
3

$X_{panel.arm1_{jl}} =$

68.5 ft
37.5
42.5
56.5

$Area_{panel.arm1_{jl}} =$

9 ft^2
1.56
1.56
1.56

Arm 1 Combined Stress Ratio and Deflection

$\max(CSR_{arm1}) = 0.901$ $\max(\Delta_{arm1}) = 10.969 \cdot in$ $2 \cdot deg \cdot \sum(L_{arm1} - L_{splice.provided}) = 28.69 \cdot in$

Arm 2 Loads

$$SignalData_{arm2} = \begin{pmatrix} \text{"SignalNumber"} & \text{"DistanceToSignal(ft)"} & \text{"NumberOfSignalHeads"} & \text{"BackPlate"} \\ 1 & 0 & 0 & \text{"yes"} \\ 2 & 0 & 0 & \text{"yes"} \\ 3 & 0 & 0 & \text{"yes"} \\ 4 & 0 & 0 & \text{"yes"} \\ 5 & 0 & 0 & \text{"yes"} \\ 6 & 0 & 0 & \text{"yes"} \\ 7 & 0 & 0 & \text{"yes"} \\ 8 & 0 & 0 & \text{"yes"} \\ 9 & 0 & 0 & \text{"yes"} \\ 10 & 0 & 0 & \text{"yes"} \end{pmatrix}$$

use X to zero out data
use 0 to keep current values *"yes" or "no"*

New Values

"SignalNumber"	"DistToSignal(ft)"	"#SignalHeads"	"BackPlate"
1	0	0	"yes"
2	0	0	"yes"
3	0	0	"yes"
4	0	0	"yes"
5	0	0	"yes"
6	0	0	"yes"
7	0	0	"yes"
8	0	0	"yes"
9	0	0	"yes"
10	0	0	"yes"

$$SignData_{arm2} = \begin{pmatrix} \text{"PanelNumber"} & \text{"DistanceToPanelCentroid(ft)"} & \text{"PanelArea(sf)"} \\ 1 & 0 & 0 \\ 2 & 0 & 0 \\ 3 & 0 & 0 \\ 4 & 0 & 0 \\ 5 & 0 & 0 \end{pmatrix}$$

New Values

"Panel#"	"DistToCentroid(ft)"	"PanelArea(sf)"
1	0	0
2	0	0
3	0	0
4	0	0
5	0	0

use X to zero out
use 0 to keep current values

Arm 2 Properties

Current Values

New Values

$L_{total.arm2} = 0\,ft$ [ ] *feet, 40 ft. max. for 1 piece arms, use X to zero out set* $L_{total.arm2} = 0ft$ *for NO ARM2*

$Diameter_{base.arm2} = 0 \cdot in$ [ ] *inches, measured flat to flat, use X to zero out (SG)*

$Dist_{splice.from.base.arm2} = 0 \cdot ft$ [ ] *feet, splice distance, for 2 piece arms, length of piece closest to pole, use X to zero out (SE)*

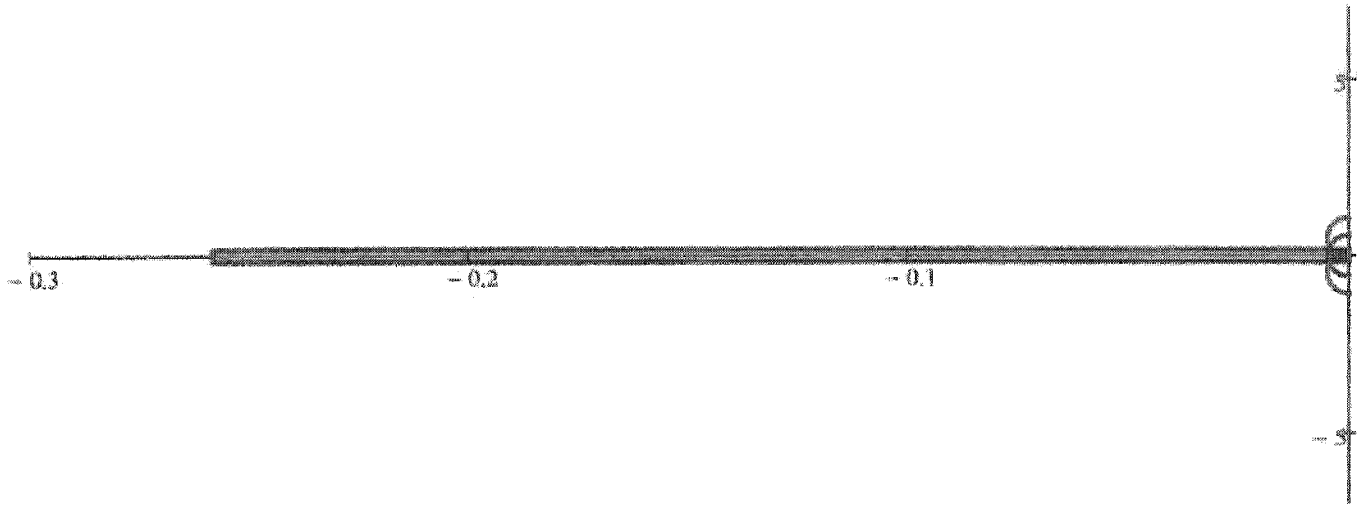
set $Dist_{splice.from.base.arm2} = 0\,ft$ *for NO SPLICE*

$t_{wall.arm2} = \begin{pmatrix} 0 \\ 0 \end{pmatrix} \cdot in$ [ ] *inches, use X to zero out (SD)*

[ ] *inches, for 2 piece arms, wall thickness of piece closest to the pole, use X to zero out (SH)*

Arm 2 Properties

Summary - Arm 2 Geometry and Loading



Location of Signs and Signals

$WindSpeed = 130 \cdot mph$ $L_{total.arm2} = 0.00\,ft$

$Diameter_{tip.arm2} = \begin{pmatrix} 0 \\ 0 \end{pmatrix} \cdot in$ $Diameter_{base.arm2} = \begin{pmatrix} 0 \\ 0 \end{pmatrix} \cdot in$ $L_{arm2} = \begin{pmatrix} 0 \\ 0 \end{pmatrix} ft$ $t_{wall.arm2} = \begin{pmatrix} 0 \\ 0 \end{pmatrix} \cdot in$

$X_{signal.arm2_{j2}} =$ $Sections_{signal.arm2_{j2}} =$ $X_{panel.arm2_{j2}} =$ $Area_{panel.arm2_{j2}} =$

0 ft	0	0.1 ft	0.1 ft^2
0	0		

Arm 2 Combined Stress Ratio and Deflection

$\max(CSR_{arm2}) = 0$ $\max(\Delta_{arm2}) = 0 \cdot in$ $2 \cdot deg \cdot \sum(L_{arm2} - L_{splice.provided}) = -1.68 \cdot in$

Luminaire Arm Analysis DataFile = "D6S4.dat" WindSpeed = 130·mph

Luminaire Properties

See Design Standards 17743 and 17743 for input values.

Current Values	New Values	set $Y_{luminaire} = 0$ ft *for NO LUMINAIRE*
$Y_{luminaire} = 0$ ft		*feet, use X to zero out (Standard LA = 40 feet)*
$X_{luminaire} = 10$·ft		*feet, use X to zero out (Standard LB = 10 feet)*
$Diameter_{base.lumarm} = 3$·in		*inches, use X to zero out (Standard LC = 3 inches)*
$t_{wall.lumarm} = 0.125$·in		*inches, use X to zero out (Standard LD = 0.125 inches)*
$Slope_{lumarm} = 0.5$		*rise/run, use X to zero out (Standard LE = 0.5)*
$n_{lumarm} = 8$·ft		*feet, use X to zero out (Standard LF = 8 feet)*
$d_{bolt.lum} = 0.5$·in		*inches, use X to zero out (Standard LG = 0.5 inches)*
$t_{baseplate.lum} = 0.75$·in		*inches, use X to zero out (Standard LH = 0.75 inches)*

Luminaire Properties

Analyze Luminaire

Summary - Luminaire Arm Geometry

$Y_{luminaire} = 0$ ft	$X_{luminaire} = 0$·ft	$Diameter_{base.lumarm} = 0$·in	$t_{wall.lumarm} = 0$·in
$Slope_{lumarm} = 0$	$n_{lumarm} = 0$·ft	$d_{bolt.lum} = 0$·in	$t_{baseplate.lum} = 0$·in
$w_{base.lum} = 0$·in	$w_{channel.lum} = 0$·in		

Luminaire Arm Ratios

$CSR_{base.lumarm} = 0$	$PR_{bolt.lum} = 0$	$PR_{baseplate.lum} = 0$	$PR_{conn.plate.lum} = 0$

Upright Analysis DataFile = "D684.dat" WindSpeed = 130·mph

Pole Properties

Current Values	New Values		
$Y_{pole} = 21.5\,ft$	21.5	*feet (UA)*	*Common wall thicknesses:*
$Y_{arm.conn} = 20\,ft$	20	*feet (UB)*	*0.1793 in.*
$Diameter_{base.pole} = 26 \cdot in$		*inches, measured flat to flat (UD)*	*0.2391 in.*
$t_{wall.pole} = 0.375 \cdot in$		*inches (UE)*	*0.25 in.*
$Gap = \begin{pmatrix} 10.5 \\ 0 \end{pmatrix} \cdot in$		*inches, clear distance between connection plate and upright*	*0.313 in.*
		inches, use X to zero out	*0.375 in.*
			0.5 in.

Pole Properties

Summary - Upright Geometry

$Y_{pole} = 21.5\,ft$ $Y_{arm.conn} = 20\,ft$ $\alpha = 0 \cdot deg$ $Gap = \begin{pmatrix} 10.5 \\ 0 \end{pmatrix} \cdot in$

$Diameter_{tip.pole} = 22.99 \cdot in$ $Diameter_{base.pole} = 26 \cdot in$ $t_{wall.pole} = 0.375 \cdot in$

Upright Combined Stress Ratio and Deflections

$\max(CSR_{pole}) = 0.539$ $\max(\Delta_{x.dl}) = 0.57 \cdot in$ $\max(\Delta_{z.dl}) = 0 \cdot in$

Mast Arm Connection(s) Analysis DataFile = "D6S4.dat" WindSpeed = 130 mph

Connection Properties

Current Values

$h_{conn.plate} = 30 \cdot in$

$t_{vertical.plate} = \begin{pmatrix} 0.75 \\ 0 \end{pmatrix} \cdot in$

$d_{bolt.conn} = \begin{pmatrix} 1.25 \\ 0 \end{pmatrix} \cdot in$

$t_{baseplate.arm} = \begin{pmatrix} 3 \\ 0 \end{pmatrix} \cdot in$

Connection Properties

New Values

inches, for two arm Mast Arms both connection plate heights must be equal (HT)

inches (FL)

inches, use X to zero out (SL)

inches (FP)

inches, use X to zero out (SP)

inches (FK)

inches, use X to zero out (SK)

Analyze Connection

Switch values, set values for DataOut

$out := out + 1 \quad out = 29.00$

$h_{conn.plate} := fSwitchData(h_{conn.plate}, newh_{conn.plate}, in)$ $\quad data_{out} := \frac{h_{conn.plate}}{in} \quad data_{out} = 30.00$

$out := out + 1 \quad out = 30.00$

$t_{vertical.plate} := fSwitchData3(t_{vertical.plate}, newt_{vertical.plate}, in)$ $\quad data_{out} := \frac{t_{vertical.plate}}{in} \quad data_{out} = \begin{pmatrix} 0.75 \\ 0.00 \end{pmatrix}$

$t_{vertical.plate_1} := if(L_{total.arm2} = 0 \cdot ft, 0 \cdot in, t_{vertical.plate_1})$

$out := out + 1 \quad out = 31.00$

$d_{bolt.conn} := fSwitchData3(d_{bolt.conn}, newd_{bolt.conn}, in)$ $\quad data_{out} := \frac{d_{bolt.conn}}{in} \quad data_{out} = \begin{pmatrix} 1.25 \\ 0.00 \end{pmatrix}$

$d_{bolt.conn_1} := if(L_{total.arm2} = 0 \cdot ft, 0 \cdot in, d_{bolt.conn_1})$

$out := out + 1 \quad out = 32.00$

$t_{baseplate.arm} := fSwitchData3(t_{baseplate.arm}, newt_{baseplate.arm}, in)$ $\quad data_{out} := \frac{t_{baseplate.arm}}{in} \quad data_{out} = \begin{pmatrix} 3.00 \\ 0.00 \end{pmatrix}$

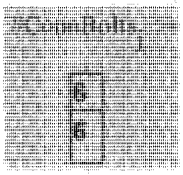
$t_{baseplate.arm_1} := if(L_{total.arm2} = 0 \cdot ft, 0 \cdot in, t_{baseplate.arm_1})$

Design Parameters

Trial Plate Thicknesses and Bolt Diameter $\quad j := 0..1$

Design Criteria:

$PR_{bolt} < 1$ *(performance ratio of bolt).* $PR_{t.baseplate.arm} < 1$ *(performance ratio of arm base plate),*
& $CSR_{t.vert.plate} < 1$ *(combined stress ratio of vertical plate).*



$F_{y\,baseplate} := 36 \cdot ksi$ *(for the base plate)*

Applied Loads

From Mast Arm Design

$M_{dl} = \begin{pmatrix} 102.1 \\ 0.0 \end{pmatrix} \cdot kip \cdot ft$ $V_{dl.arm} = \begin{pmatrix} 3.6 \\ 0.0 \end{pmatrix} \cdot kip$ $t_{arm} = \begin{pmatrix} 0.375 \\ 0 \end{pmatrix} \cdot in$ $d_{base.arm} = \begin{pmatrix} 19.00 \\ 0.00 \end{pmatrix} \cdot in$

$M_{wl} = \begin{pmatrix} 301.0 \\ 0.0 \end{pmatrix} \cdot kip \cdot ft$ $V_{wl.arm} = \begin{pmatrix} 7.5 \\ 0.0 \end{pmatrix} \cdot kip$ $Gap = \begin{pmatrix} 10.50 \\ 0.00 \end{pmatrix} \cdot in$

Note: Gap is the distance between the upright and the Arm Base Plate. (5.5 inches is a suggested minimum for two arm poles)

$Diameter_{conn.pole} = 23.20 \cdot in$ *From Upright Design (at arm connection)*

$Offset_{conn} := Gap + \frac{Diameter_{conn.pole}}{2}$ $Offset_{conn} = \begin{pmatrix} 22.10 \\ 11.60 \end{pmatrix} \cdot in$ *(FO)* *(SO)*

Total Factored Moment and Shear

AISC LRFD, Vol 1, 6-A4 Specs, 2nd Ed.

$M_{u.conn_j} := \sqrt{\left(1.2 \cdot M_{dl_j}\right)^2 + \left(1.3 \cdot M_{wl_j}\right)^2}$ $M_{u.conn} = \begin{pmatrix} 410.0 \\ 0.0 \end{pmatrix} \cdot kip \cdot ft$

$V_{u.conn_j} := \sqrt{\left(1.2 \cdot V_{dl.arm_j}\right)^2 + \left(1.3 \cdot V_{wl.arm_j}\right)^2}$ $V_{u.conn} = \begin{pmatrix} 10.7 \\ 0.0 \end{pmatrix} \cdot kip$

Arm Base Plate Dimensions

Control dimensions

$Distance_{bolt.edge_j} := Ceil\left(2 \cdot d_{bolt.conn_j}, \frac{1}{4} \cdot in\right)$ *rounded up to the next 1/4 inch dimension* $Distance_{bolt.edge} = \begin{pmatrix} 2.50 \\ 0.00 \end{pmatrix} \cdot in$

$ControlDim_j := if\left[\left(d_{base.arm_j} > Diameter_{conn.pole}\right), Ceil\left(d_{base.arm_j}, \frac{1}{2} \cdot in\right), Ceil\left(Diameter_{conn.pole}, \frac{1}{2} \cdot in\right)\right]$

$ControlDim = \begin{pmatrix} 23.5 \\ 23.5 \end{pmatrix} \cdot in$

Minimum Mast Arm base plate height $t_{vertical.plate_j} := if\left(t_{vertical.plate_j} = 0 \cdot in, .1 \cdot in, t_{vertical.plate_j}\right)$

$$h_{min.conn.plate_j} := max\left[\left[\sqrt[3]{\frac{d_{base.arm_j} + 3 \cdot in}{\pi \cdot \left(\frac{d_{base.arm_j}}{2}\right)^3 \cdot t_{arm_j} \cdot \left(\frac{12}{t_{vertical.plate_j}}\right)}}\right]\right]$$

$h_{min.conn.plate} = \begin{pmatrix} 25.3 \\ 3.0 \end{pmatrix} \cdot in$

$h_{conn.plate} = 30.00 \cdot in$

Mast Arm base plate height, rounded up to next 1 inch dimension if necessary

$h_{conn.plate_j} := if\left[\left(h_{conn.plate} > \max\left(h_{min.conn.plate}\right)\right), h_{conn.plate}, Ceil\left(\max\left(h_{min.conn.plate}\right), in\right)\right]$ $h_{conn.plate} = 30.00 \cdot in$

Mast Arm base plate width

$b_{conn.plate_j} := \left(ControlDim_j + 2 \cdot Distance_{bolt.edge_j} + 4 \cdot d_{bolt.conn_j} + 2 \cdot t_{vertical.plate_j}\right)$ $b_{conn.plate} = \begin{pmatrix} 35 \\ 23.7 \end{pmatrix} \cdot in$

Mast Arm base plate width round up to next 1 inch dimension

$b_{conn.plate_j} := if\left[\left(t_{vertical.plate_j} = 0 \cdot in\right), 0 \cdot in, Ceil\left(b_{conn.plate_j}, in\right)\right]$ $b_{conn.plate} = \begin{pmatrix} 35.00 \\ 24.00 \end{pmatrix} \cdot in$ *(FJ)* *(SJ)*

Use a 36" long connection plate to match Index 17743. $b_{conn.plate} := \begin{pmatrix} 36.00 \\ 24.00 \end{pmatrix} \cdot in$

Bolt spacing

$Spacing_{bolts.conn_j} := if\left[\left(t_{vertical.plate_j} = 0 \cdot in\right), 0 \cdot in, \frac{h_{conn.plate} - \left(2 \cdot Distance_{bolt.edge_j}\right)}{0.5 \cdot \#ConnBolts_j - 1}\right]$ $Spacing_{bolts.conn} = \begin{pmatrix} 12.5 \\ 15 \end{pmatrix} \cdot in$ *(FS)* *(SS)*

D. Calculate Bolt Loads

Calculate Capacities of Connection Elements Based on the AISC LRFD Code, 2nd Edition

(Research Report 1126-4F by the Bureau of Engineering Research at the Univ. of Texas at Austin)
(Design of bolts and plates based on Design Guide for Steel to Concrete Connections by Cook, Doerr & Klingner)

$Fy_{bolt_j} := if\left[\left(d_{bolt.conn_j} \le 1.0 \cdot in\right), 92 \cdot ksi, 81 \cdot ksi\right]$ *min. yield stress for A325 bolts* $Fy_{bolt} = \begin{pmatrix} 81 \\ 92 \end{pmatrix} \cdot ksi$

$A_{A325bolts} = \begin{pmatrix} 0.5 & 0.625 & 0.75 & 0.875 & 1 & 1.125 & 1.25 & 1.375 & 1.5 & 0 & 1.75 \\ 0.142 & 0.226 & 0.334 & 0.462 & 0.606 & 0.763 & 0.969 & 1.16 & 1.41 & 0 & 1.9 \end{pmatrix}$ *bolt diameter* / *net tensile area*

$A_{net.bolt_j} := hlookup\left(\frac{d_{bolt.conn_j}}{in}, A_{A325bolts}, 1\right) \cdot in^2$ $A_{net.bolt} = \begin{pmatrix} 0.97 \\ 0.00 \end{pmatrix} \cdot in^2$

$T_{n.bolts_j} := \left[\left(A_{net.bolt_j}\right) \cdot \left(Fy_{bolt_j}\right)\right] \cdot \frac{\#ConnBolts_j}{2}$ $T_{n.bolts} = \begin{pmatrix} 235.5 \\ 0.0 \end{pmatrix} \cdot kip$

Bending plane under full dead and wind load

$\theta_j := atan\left(\frac{1.2 \cdot M_{dl_j}}{1.3 \cdot M_{wl_j}}\right)$ $\theta = \begin{pmatrix} 17.4 \\ 0.0 \end{pmatrix} \cdot deg$

Calculate the bolt moment arm

$$RC_j := \left(\frac{\frac{b_{conn.plate_j}}{2} - Distance_{bolt.edge_j}}{\cos(\theta_j)} + \frac{d_{base.arm_j}}{2} \right) \qquad RC = \begin{pmatrix} 25.7 \\ 12 \end{pmatrix} \cdot in$$

$$d_{base} := \begin{pmatrix} Diameter_{temp.arm1} \\ Diameter_{temp.arm2} \end{pmatrix} \qquad d_{base} = \begin{pmatrix} 19.00 \\ 0.00 \end{pmatrix} \cdot in \qquad b_{conn.plate} = \begin{pmatrix} 36.00 \\ 24.00 \end{pmatrix} \cdot in \qquad h_{conn.plate} = 30.00 \cdot in \qquad \theta = \begin{pmatrix} 17.4 \\ 0.0 \end{pmatrix} \cdot deg$$

$$Yieldangle_{test_j} := atan\left[\frac{\frac{b_{conn.plate_j}}{2} - \frac{d_{base_j}}{2} + \frac{d_{base_j}}{2} \cdot (1 - \cos(\theta_j))}{\frac{h_{conn.plate}}{2} + \frac{d_{base_j}}{2} \cdot \sin(\theta_j)} \right] \qquad Yieldangle_{test} = \begin{pmatrix} 26.60 \\ 38.66 \end{pmatrix} \cdot deg$$

$$Yieldline_j := \frac{\frac{b_{conn.plate_j}}{2} - \frac{d_{base_j}}{2} + \frac{d_{base_j}}{2} \cdot (1 - \cos(\theta_j)) + \tan(\theta_j) \cdot \left(\frac{h_{conn.plate}}{2} - \frac{d_{base_j}}{2} \cdot \sin(\theta_j) \right)}{if[(\sin(\theta_j) = 0), 1, \sin(\theta_j)]} \qquad Yieldline = \begin{pmatrix} 42.64 \\ 12.00 \end{pmatrix} \cdot in$$

$$Yieldline_j := if\left[\left(Yieldangle_{test_j} \le \theta_j \right), Yieldline_j, \frac{h_{conn.plate}}{\cos(\theta_j)} \right] \qquad Yieldline = \begin{pmatrix} 31.44 \\ 30.00 \end{pmatrix} \cdot in$$

$$M_{p.plate_j} := Yieldline_j \cdot F_{y.baseplate} \frac{(t_{baseplate.arm_j})^2}{4} \qquad M_{p.plate} = \begin{pmatrix} 212.2 \\ 0 \end{pmatrix} \cdot kip \cdot ft$$

See Reference file for variable definitions

$$CompForceOffset_j := if\left(0.5 \cdot \frac{b_{conn.plate_j}}{\cos(\theta_j)} = 0.5 \cdot in < \frac{M_{p.plate_j}}{T_{n.bolts_j}}, 0.5 \cdot \frac{b_{conn.plate_j}}{\cos(\theta_j)} - 0.5 \cdot in, \frac{M_{p.plate_j}}{T_{n.bolts_j}} \right) \qquad CompForceOffset = \begin{pmatrix} 10.81 \\ 0 \end{pmatrix} \cdot$$

$$T_{u.conn_j} := \frac{M_{u.conn_j}}{RC_j + CompForceOffset_j + t_{strut_j}} \qquad T_{u.conn} = \begin{pmatrix} 133.2 \\ 0.0 \end{pmatrix} \cdot kip$$

$$DistA_j := \frac{b_{conn.plate_j}}{2} - Distance_{bolt.edge_j} \qquad DistA = \begin{pmatrix} 15.50 \\ 12.00 \end{pmatrix} \cdot in$$

$$T_{n.bolt.max_j} := \frac{T_{u.conn_j}}{0.5 \cdot \#ConnBolts_j} + \frac{DistA_j \cdot \tan(\theta_j) \cdot T_{u.conn_j} \left(\#ConnBolts_j \cdot 0.25 - 0.5 \right) \cdot Spacing_{bolts.conn_j}}{\sum_{n=0}^{floor(0.25 \cdot \#ConnBolts_j)} \left[\frac{\left[\left(\#ConnBolts_j \cdot 0.5 \right) - 1 \right] - 2 \cdot n}{2} \cdot Spacing_{bolts.conn_j} \right]^2 \cdot 2}$$

$$T_{n.bolt.max} = \begin{pmatrix} 70.3 \\ 0.0 \end{pmatrix} \cdot kip$$

$$V_{u.bolt_j} := \frac{V_{u.conn_j}}{\#ConnBolts_j} \qquad \textit{Shear per Bolt} \qquad V_{u.bolt} = \begin{pmatrix} 1.78 \\ 0.00 \end{pmatrix} \cdot kip$$

$$A_{gross.bolt_j} := \left[\pi \cdot \left(\frac{d_{bolt.conn_j}}{2}\right)^2\right]$$ *Gross Bolt Area used for shear*

$$A_{gross.bolt} = \begin{pmatrix} 1.227 \\ 0 \end{pmatrix} \cdot in^2$$

$$f_{v_j} := \frac{V_{u.bolt_j}}{A_{gross.bolt_j}}$$ *Bolt Shear Stress*

$$f_v = \begin{pmatrix} 1.45 \\ 0.00 \end{pmatrix} \cdot ksi$$

$$f_{t_j} := \frac{T_{u.bolt.max_j}}{A_{gross.bolt_j}}$$ *Bolt Tensile Stress*

$$f_t = \begin{pmatrix} 57.3 \\ 0.0 \end{pmatrix} \cdot ksi$$

$$F_{t_j} := \min\left(\begin{pmatrix} 117 \cdot ksi - 1.9 \cdot f_{v_j} \\ 90 \cdot ksi \end{pmatrix}\right)$$ *Tension Stress Limit (A325 bolts)*

AISC Table J3.5

$$F_t = \begin{pmatrix} 90.00 \\ 90.00 \end{pmatrix} \cdot ksi$$

$\phi_{t_j} := 0.75$

$$\phi_t \cdot F_t = \begin{pmatrix} 67.50 \\ 67.50 \end{pmatrix} \cdot ksi$$

$$PR_{bolt_j} := \frac{f_{t_j}}{\phi_t \cdot F_{t_j}}$$ *Bolt Capacity Ratio*

$$PR_{bolt} = \begin{pmatrix} 0.85 \\ 0 \end{pmatrix}$$

(if PR<= 1, then ok)

Check Arm Base Plate Thickness

See Reference file for formula derivations $\phi_{v_j} := 0.90$

$$t_{baseplate.arm.reqd_j} := \text{if}\left[\left(V_{u.conn_j} = 0\right), 0 \cdot in, \sqrt{\frac{4 \cdot T_{u.bolts_j} \cdot \left(DistA_j - \frac{d_{base.arm_j}}{2}\right)}{\left(\phi \cdot F_{y.baseplate}\right) \cdot h_{conn.plate}}}\right]$$

$$t_{baseplate.arm.reqd} = \begin{pmatrix} 2.41 \\ 0.00 \end{pmatrix} \cdot in$$

$$t_{baseplate.arm} = \begin{pmatrix} 3.000 \\ 0.000 \end{pmatrix} \cdot in$$

$$PR_{t.baseplate.arm_j} := \frac{t_{baseplate.arm.reqd_j}}{t_{baseplate.arm_j}}$$

$$PR_{t.baseplate.arm} = \begin{pmatrix} 0.8 \\ 0 \end{pmatrix}$$

(if PR <= 1.0 ok)

Upright Connection Plate Thickness

See Reference file for formula derivations

$$t_{conn.plate.reqd_j} := \sqrt{\frac{4 \cdot T_{u.bolts_j} \cdot \left(\frac{b_{conn.plate_j} - Diameter_{conn.pole} - 2 \cdot t_{vertical.plate_j} - 2 \cdot Distance_{bolt.edge_j}}{2}\right)}{\left(\phi \cdot F_{y.baseplate}\right) \cdot h_{conn.plate}}}$$

Round up to next quarter inch dimension.

$t_{conn.plate.reqd} = \begin{pmatrix} 1.75 \\ 0.00 \end{pmatrix} \cdot in$

$t_{conn.plate_j} := Ceil\left(t_{conn.plate.reqd_j}, \frac{1}{8} \cdot in\right)$

$t_{conn.plate} = \begin{pmatrix} 1.750 \\ 0.000 \end{pmatrix} \cdot in$ *(FR)* *(SR)*

Use a 2" thick connection plate to match index 17743.

$t_{conn.plate} := \begin{pmatrix} 2.0 \\ 0.000 \end{pmatrix} \cdot in$

$PR_{t.conn plate.arm_j} := \frac{t_{conn.plate.reqd_j}}{t_{conn.plate_j}}$

$PR_{t.conn plate.arm} = \begin{pmatrix} 0.87 \\ 0 \end{pmatrix}$

Weld Size of Arm to Plate Connection

(Design welds of the socket joint to carry 100% of the design load using an E70 electrode).

$S_{weld_j} := \pi \cdot \left(\frac{d_{base.arm_j}}{2}\right)^2$ $L_{weld_j} := \pi \cdot d_{base.arm_j}$ *Weld Properties*

$f_{weld_j} := \sqrt{\left(\frac{M_{u.conn_j}}{S_{weld_j}}\right)^2 + \left(\frac{V_{u.conn_j}}{L_{weld_j}}\right)^2}$ *Total Stress on Weld*

$f_{weld} = \begin{pmatrix} 17.36 \\ 0.00 \end{pmatrix} \cdot \frac{kip}{in}$

Max. Bottom Weld Size

$w_{bot.arm_j} := if\left[\left(t_{arm_j} = 0 \cdot in\right), 0 \cdot in, t_{arm_j} - \left(\frac{1}{16} \cdot in\right)\right]$ $w_{bot.arm_j} := Ceil\left(w_{bot.arm_j}, \frac{1}{16} \cdot in\right)$ $w_{bot.arm} = \begin{pmatrix} 0.3125 \\ 0 \end{pmatrix} \cdot in$ *(FM)* *(SM)*

$f_{bot.weld_j} := w_{bot.arm_j} \cdot \left[(0.75) \cdot (0.6) \cdot (70 \cdot ksi) \cdot \left(\frac{1}{\sqrt{2}}\right)\right]$ *Bottom Weld Stress* ***AISC Table J2.5***

$f_{bot.weld} = \begin{pmatrix} 6.96 \\ 0.00 \end{pmatrix} \cdot \frac{kip}{in}$

$f_{top.weld_j} := f_{weld_j} - f_{bot.weld_j}$ *Top Weld Stress*

$f_{top.weld} = \begin{pmatrix} 10.39 \\ 0.00 \end{pmatrix} \cdot \frac{kip}{in}$

$w_{top.arm_j} := \frac{f_{top.weld_j}}{(0.75) \cdot (0.6) \cdot (70 \cdot ksi) \cdot \left(\frac{1}{\sqrt{2}}\right)}$ *Top Weld Size* $w_{top.arm_j} := Ceil\left(w_{top.arm_j}, \frac{1}{16} \cdot in\right)$ $w_{top.arm} = \begin{pmatrix} 0.5000 \\ 0.0000 \end{pmatrix} \cdot in$

$w_{top.arm_j} := if\left[\left(w_{top.arm_j} > t_{arm_j}\right), w_{top.arm_j}, Ceil\left(t_{arm_j}, \frac{1}{16} \cdot in\right)\right]$ *Round up to next 1/16 inch*

$w_{top.arm} = \begin{pmatrix} 0.5000 \\ 0.0000 \end{pmatrix} \cdot in$ *(FQ)* *(SQ)*

Size of Vertical Welds to Upright

(Design welds to resist dead load moment , wind load moment, and dead load shear using an E70 electrode)

$S_{all.mom} := \frac{h_{conn.plate}^2}{3}$ *Weld Properties* $S_{wl.mom} := Diameter_{conn.pole} \cdot h_{conn.plate}$

$A_{dl.shr} := 2 \cdot h_{conn.plate}$ $\quad r_{upright} := \frac{Diameter_{conn.pole}}{2}$

$$f_{weld_j} := \sqrt{\left[\frac{1.2 \cdot \left[M_{dl_j} + V_{dl.arm_j} \cdot \left[\left(r_{upright}\right) + Gap_j\right]\right]}{S_{dl.mom}}\right]^2 + \left[\frac{1.3 \cdot \left[M_{wl_j} + V_{wl.arm_j} \cdot \left[\left(r_{upright}\right) + Gap_j\right]\right]}{S_{wl.mom}}\right]^2 + \left(\frac{1.2 \cdot V_{dl.arm_j}}{A_{dl.shr}}\right)^2}$$

$$f_{weld} = \begin{pmatrix} 8.8 \\ 0.0 \end{pmatrix} \cdot \frac{kip}{in}$$

Plate/Upright Weld size

$$w_{vert.plate_j} := \frac{f_{weld_j}}{0.75 \cdot (0.6 \cdot 70 \cdot ksi) \cdot \left(\frac{1}{\sqrt{2}}\right)}$$ ***AISC Table J2.5***

$w_{vert.plate_j} := Ceil\left(w_{vert.plate_j}, \frac{1}{16} \cdot in\right)$ $\quad w_{vert.plate} = \begin{pmatrix} 0.4375 \\ 0.0000 \end{pmatrix} \cdot in$

$w_{p.min_j} := if\left[\left(t_{vertical.plate_j} \geq \frac{1}{2} \cdot in\right), \frac{1}{4} \cdot in, \frac{3}{16} \cdot in\right]$ *min weld size* ***AISC Table J2.4***

$w_{p.min_j} := if\left[\left(t_{vertical.plate_j} = 0 \cdot in\right), 0 \cdot in, w_{p.min_j}\right]$ $\quad w_{p.min} = \begin{pmatrix} 0.25 \\ 0.1875 \end{pmatrix} \cdot in$

$w_{vertical.plate_j} := if\left[\left(w_{vert.plate_j} > w_{p.min_j}\right), w_{vert.plate_j}, w_{p.min_j}\right]$ $\quad w_{vertical.plate} = \begin{pmatrix} 0.4375 \\ 0.1875 \end{pmatrix} \cdot in$ $\begin{matrix} (FN) \\ (SN) \end{matrix}$

Size of Vertical Welds to Connection Plate

$w_{conn.plate_j} := w_{vert.plate_j}$ $\quad w_{conn.plate} = \begin{pmatrix} 0.4375 \\ 0.0000 \end{pmatrix} \cdot in$

$w_{c.min_j} := if\left[\left(t_{conn.plate_j} \geq \frac{3}{4} \cdot in\right), \frac{5}{16} \cdot in, \frac{1}{4} \cdot in\right]$ *min weld size* ***AISC Table J2.4*** $\quad w_{c.min} = \begin{pmatrix} 0.3125 \\ 0.2500 \end{pmatrix} \cdot in$

$w_{c.min_j} := if\left[\left(w_{c.min_j} > t_{vertical.plate_j}\right), t_{vertical.plate_j}, w_{c.min_j}\right]$ *min weld size* ***AISC p. 8-119*** $\quad w_{c.min} = \begin{pmatrix} 0.3125 \\ 0.1000 \end{pmatrix} \cdot in$

$w_{conn.plate_j} := if\left[\left(w_{conn.plate_j} > w_{c.min_j}\right), w_{conn.plate_j}, w_{c.min_j}\right]$ $\quad w_{conn.plate} = \begin{pmatrix} 0.4375 \\ 0.1 \end{pmatrix} \cdot in$ $\begin{matrix} (FT) \\ (ST) \end{matrix}$

Check Thickness of Vertical Plates

$t_{vertical.plate} = \begin{pmatrix} 0.750 \\ 0.100 \end{pmatrix} \cdot in$ *Trial Plate Thickness*

$h_{vertical.plate} := h_{conn.plate}$ $\quad A_{vertical.plate_j} := t_{vertical.plate_j} \cdot h_{vertical.plate}$ $\quad A_{vertical.plate} = \begin{pmatrix} 22.5 \\ 3 \end{pmatrix} \cdot in^2$

$L_{b_j} := \frac{Diameter_{conn.pole}}{2} + Gap_j - t_{conn.plate_j}$ $\quad L_b = \begin{pmatrix} 20.1 \\ 11.6 \end{pmatrix} \cdot in$

$$r_{y_j} := \frac{t_{vertical\ plate_j}}{\sqrt{12}} \qquad r_y = \begin{pmatrix} 0.2 \\ 0.0 \end{pmatrix} \cdot in$$

$$\lambda_j := if\left[\left(t_{vertical\ plate_j} = 0 \cdot in\right), 0, \frac{L_{b_j}}{r_{y_j}}\right] \qquad \textit{Controlling Slenderness Parameter} \qquad \lambda = \begin{pmatrix} 92.8 \\ 401.8 \end{pmatrix}$$

$$M_{p_j} := \frac{h_{vertical\ plate}^{2} \cdot t_{vertical\ plate_j}}{4} \cdot F_{y\ baseplate} \qquad \textit{Plastic Moment} \qquad M_p = \begin{pmatrix} 506.2 \\ 67.5 \end{pmatrix} \cdot kip \cdot ft$$

$$M_{r_j} := \frac{h_{vertical\ plate}^{2} \cdot t_{vertical\ plate_j}}{6} \cdot F_{y\ baseplate} \qquad \textit{Limiting Buckling Moment} \qquad M_r = \begin{pmatrix} 337.5 \\ 45.0 \end{pmatrix} \cdot kip \cdot ft$$

$$J_j := 0.3 \cdot \left(t_{vertical\ plate_j}\right)^3 \cdot h_{vertical\ plate} \qquad A_j := A_{vertical\ plate_j} \qquad E := 29000 \cdot ksi$$

$$\lambda_{p_j} := \frac{(3750 \cdot ksi) \cdot \sqrt{J_j \cdot A_j}}{M_{p_j}} \qquad \textit{Flexural Slenderness Parameters} \qquad \lambda_p = \begin{pmatrix} 5.7 \\ 0.8 \end{pmatrix}$$

$$\lambda_{r_j} := \frac{(57000 \cdot ksi) \cdot \sqrt{J_j \cdot A_j}}{M_{r_j}} \qquad \underline{\textit{AISC Table A-F1.1}} \qquad \lambda_r = \begin{pmatrix} 130.1 \\ 17.3 \end{pmatrix}$$

$$M_{n_j} := \left[M_{p_j} - \left(M_{p_j} - M_{r_j}\right)\left(\frac{\lambda_j - \lambda_{p_j}}{\lambda_{r_j} - \lambda_{p_j}}\right)\right]$$

For $1_j < 1 <= 1_j$
Nominal Flex. Strength
AISC Eqn A-F1-3

$$M_n = \begin{pmatrix} 388 \\ -477 \end{pmatrix} \cdot kip \cdot ft$$

$$M_{cr_j} := \frac{(57000 \cdot ksi) \cdot \sqrt{J_j \cdot A_j}}{\lambda_j}$$

For $1_j < 1$
Nominal Flex. Strength
AISC Eqn F1-14

$$M_{cr} = \begin{pmatrix} 473 \\ 2 \end{pmatrix} \cdot kip \cdot ft$$

$$\phi M_{n_j} := if\left[\left(\lambda_{p_j} < \lambda_j\right), 0.9 \cdot M_{n_j}, 0.9 \cdot M_{p_j}\right] \qquad \phi M_n = \begin{pmatrix} 349.2 \\ -429.0 \end{pmatrix} \cdot kip \cdot ft$$

$$\phi M_{n_j} := if\left[\left(\lambda_{r_j} < \lambda_j\right), 0.9 \cdot M_{cr_j}, \phi M_{n_j}\right] \qquad \phi M_n = \begin{pmatrix} 349.2 \\ 1.7 \end{pmatrix} \cdot kip \cdot ft$$

$$M_{u_j} := \frac{1.2 \cdot \left[M_{dl_j} + V_{dl.arm_j} \cdot \left(r_{upright} + Gap_j\right)\right]}{2} \qquad \textit{Required Flexural Strength} \qquad M_u = \begin{pmatrix} 65.3 \\ 0.0 \end{pmatrix} \cdot kip \cdot ft$$

$$\lambda_{c_j} := \text{if}\left[\left(t_{\text{vertical plate}_j} \neq 0\cdot\text{in}\right), \frac{L_{b_j}}{r_{y_j}\cdot\pi}\sqrt{\frac{F_{y.\text{baseplate}}}{E}}, 0\right]$$

Column Slenderness Parameter

AISC Eqn E2-4

$$\lambda_c = \begin{pmatrix} 1.041 \\ 4.507 \end{pmatrix}$$

$$F_{cr_j} := \text{if}\left[\left(\lambda_{c_j} \leq 1.5\right), \left[0.658^{\left(\lambda_{c_j}\right)^2}\right]\cdot F_{y.\text{baseplate}}, \left[\frac{0.877}{\left(\lambda_{c_j}\right)^2}\right]\cdot F_{y.\text{baseplate}}\right]$$

Nominal Critical Stress

AISC Eqns E2-2 & E2-3

$$F_{cr} = \begin{pmatrix} 22.9 \\ 1.6 \end{pmatrix}\cdot\text{ksi}$$

$$\phi P_{n_j} := 0.85\cdot A_j\cdot F_{cr_j}$$

Nominal Compressive Strength

AISC Eqn E2-1

$$\phi P_n = \begin{pmatrix} 437.4 \\ 4.0 \end{pmatrix}\cdot\text{kip}$$

$$P_{u_j} := \frac{1.3\cdot\left[M_{wl_j} + V_{wl.arm_j}\cdot\left[\left(r_{upright}\right) + Gap_j\right]\right]}{\text{Diameter}_{conn.pole}}$$

Required Compressive Strength

$$P_u = \begin{pmatrix} 211.7 \\ 0 \end{pmatrix}\cdot\text{kip}$$

$$CSR_{t.vert.plate_j} := \text{if}\left[\left(\frac{P_{u_j}}{\phi P_{n_j}} \geq 0.2\right), \left(\frac{P_{u_j}}{\phi P_{n_j}} + \frac{8}{9}\cdot\frac{M_{u_j}}{\phi M_{n_j}}\right), \left(\frac{P_{u_j}}{2\cdot\phi P_{n_j}} + \frac{M_{u_j}}{\phi M_{n_j}}\right)\right]$$

Combined Stress Ratio
Flexure and Tension memb

AISC Eqns H1-1a & H1-1b

$$CSR_{t.vert.plate} = \begin{pmatrix} 0.650 \\ 0.000 \end{pmatrix}$$

(If CSR<1, then ok)

$$PR_0 := \max\left(\begin{pmatrix} PR_{bolt_0} \\ PR_{t.baseplate.arm_0} \\ PR_{t.conplate.arm_0} \\ CSR_{t.vert.plate_0} \end{pmatrix}\right)$$

$$PR_1 := \text{if}\left[\left(M_{dl_1} = 0\cdot\text{kip}\cdot\text{ft}\right), 0, \max\left(\begin{pmatrix} PR_{bolt_1} \\ PR_{t.baseplate.arm_1} \\ PR_{t.conplate.arm_1} \\ CSR_{t.vert.plate_1} \end{pmatrix}\right)\right]$$

$$PR = \begin{pmatrix} 0.874 \\ 0.000 \end{pmatrix}$$

(If PR<1, then ok)

$j := 0..1$ $\quad vert_{plt.width_j} := r_{upright} + Gap_j - t_{conn.plate_j}$ $\quad vert_{plt.width_1} := \text{if}\left[\left(M_{dl_1} = 0\cdot\text{kip}\cdot\text{ft}\right), 0\cdot\text{in}, vert_{plt.width_1}\right]$

set variables equal to zero if there is no second arm

$b_{conn.plate_1} := \text{fSetZero}\left(b_{conn.plate_1}, \text{in}\right)$

$Gap_1 := \text{fSetZero}\left(Gap_1, \text{in}\right)$

$t_{conn.plate_1} := \text{fSetZero}\left(t_{conn.plate_1}, \text{in}\right)$

$t_{baseplate.arm_1} := \text{fSetZero}\left(t_{baseplate.arm_1}, \text{in}\right)$

$w_{conn.plate_1} := \text{fSetZero}\left(w_{conn.plate_1}, \text{in}\right)$

$w_{top.arm_1} := \text{fSetZero}\left(w_{top.arm_1}, \text{in}\right)$

$Offset_{conn_1} := \text{fSetZero}\left(Offset_{conn_1}, \text{in}\right)$

$t_{vertical.plate_1} := \text{fSetZero}\left(t_{vertical.plate_1}, \text{in}\right)$

$d_{bolt.conn_1} := \text{fSetZero}\left(d_{bolt.conn_1}, \text{in}\right)$

$\#ConnBolts_1 := \text{fSetZero}\left(\#ConnBolts_1, 1\right)$

$w_{bot.arm_1} := \text{fSetZero}\left(w_{bot.arm_1}, \text{in}\right)$

$Spacing_{bolts.conn_1} := \text{fSetZero}\left(Spacing_{bolts.conn_1}, \text{in}\right)$

$w_{vertical.plate_1} := \text{fSetZero}\left(w_{vertical.plate_1}, \text{in}\right)$

$$PR_{bolt_1} := \text{if}\left[\left(L_{total.arm2} = 0\cdot\text{ft}\right) + \left(newL_{total.arm2} = \text{"X"}\right) + \left(newL_{total.arm2} = \text{"X"}\right), 0, PR_{bolt_1}\right]$$

$$PR_{t.baseplate.arm_1} := \text{if}\left[\left(L_{total.arm2} = 0\cdot\text{ft}\right) + \left(newL_{total.arm2} = \text{"X"}\right) + \left(newL_{total.arm2} = \text{"X"}\right), 0, PR_{t.baseplate.arm_1}\right]$$

$$CSR_{t.vert.plate_i} := if\left[\left(L_{total.arm2} = 0\cdot ft\right) + \left(newL_{total.arm2} = "x"\right) + \left(newL_{total.arm2} = "X"\right), 0, CSR_{t.vert.plate_i}\right]$$

$$PR_{t.complate.arm_i} := if\left[\left(L_{total.arm2} = 0\cdot ft\right) + \left(newL_{total.arm2} = "x"\right) + \left(newL_{total.arm2} = "X"\right), 0, PR_{t.complate.arm_i}\right]$$

Analyze Connection

Summary - Connection Geometry

$h_{conn.plate} = 30\cdot in$ $\quad Gap = \begin{pmatrix} 10.5 \\ 0 \end{pmatrix}\cdot in$ $\quad Offset_{conn} = \begin{pmatrix} 22.1 \\ 0 \end{pmatrix}\cdot in$

$d_{bolt.conn} = \begin{pmatrix} 1.25 \\ 0 \end{pmatrix}\cdot in$ $\quad \#ConnBolts = \begin{pmatrix} 6 \\ 0 \end{pmatrix}$ $\quad Spacing_{bolts.conn} = \begin{pmatrix} 12.5 \\ 0 \end{pmatrix}\cdot in$

$t_{conn.plate} = \begin{pmatrix} 2 \\ 0 \end{pmatrix}\cdot in$ $\quad b_{conn.plate} = \begin{pmatrix} 36 \\ 0 \end{pmatrix}\cdot in$ $\quad t_{vertical.plate} = \begin{pmatrix} 0.75 \\ 0 \end{pmatrix}\cdot in$ $\quad t_{baseplate.arm} = \begin{pmatrix} 3 \\ 0 \end{pmatrix}\cdot in$

$w_{conn.plate} = \begin{pmatrix} 0.4375 \\ 0 \end{pmatrix}\cdot in$ $\quad w_{vertical.plate} = \begin{pmatrix} 0.4375 \\ 0 \end{pmatrix}\cdot in$

Connection Ratios

$PR_{bolt} = \begin{pmatrix} 0.848 \\ 0 \end{pmatrix}$ $\quad CSR_{t.vert.plate} = \begin{pmatrix} 0.65 \\ 0 \end{pmatrix}$ $\quad PR_{t.baseplate.arm} = \begin{pmatrix} 0.804 \\ 0 \end{pmatrix}$ $\quad PR_{t.complate.arm} = \begin{pmatrix} 0.874 \\ 0 \end{pmatrix}$

Base Plate Analysis DataFile = "D6S4.dat" WindSpeed = 130·mph

Base Plate Properties

Current Values	New Values	
#AnchorRods = 6		*use 6 bolts minimum*
$d_{bolt.pole} = 2\cdot in$		*Inches (BC)*

Base Plate Properties

Analyze Base Plate & Anchors

Switch values, set values for DataOut

$out := out + 1 \quad out = 33.00$

$\#AnchorRods := fSwitchData(\#AnchorRods, new\#AnchorRods, 1)$ $\quad data_{out} := \#AnchorRods \quad data_{out} = 6.00$

$out := out + 1 \quad out = 34.00$

$d_{bolt.pole} := fSwitchData(d_{bolt.pole}, newd_{bolt.pole}, in)$ $\quad data_{out} := \frac{d_{bolt.pole}}{in} \quad data_{out} = 2.00$

Applied Loads (from Upright Design)

$M_{x.polebase} = \begin{pmatrix} 0.0 \\ 165.7 \\ 165.7 \end{pmatrix} \cdot kip \cdot ft \quad M_{y.polebase} = \begin{pmatrix} 314.8 \\ 0.0 \\ 314.8 \end{pmatrix} \cdot kip \cdot ft \quad M_{z.polebase} = \begin{pmatrix} 0.0 \\ 112.0 \\ 112.0 \end{pmatrix} \cdot kip \cdot ft$

maximum torsion (Mx & Mz not used)
maximum overturning (My not used)
maximum CSR

$V_{x.polebase} = \begin{pmatrix} 0.0 \\ 0.3 \\ 0.3 \end{pmatrix} \cdot kip \quad AxialForce_{polebase} = \begin{pmatrix} 5.8 \\ 5.8 \\ 5.8 \end{pmatrix} \cdot kip \quad V_{z.polebase} = \begin{pmatrix} 0.0 \\ 9.0 \\ 9.0 \end{pmatrix} \cdot kip$

$Diameter_{base.pole} = 26.00 \cdot in$

$t_{pole} = 0.3750 \cdot in$

$C_{a.pole} = 1.00$

load cases for maximum torsion (T), overturning (OT), and Combined Stress Ratio (CSR)

$LoadCaseT := 0 \quad LoadCaseOT := 1 \quad LoadCaseCSR := 2$

$M_{x.polebase_{LoadCaseT}} = 0.0 \cdot kip \cdot ft \quad M_{y.polebase_{LoadCaseT}} = 314.8 \cdot kip \cdot ft \quad M_{z.polebase_{LoadCaseT}} = 0.0 \cdot kip \cdot ft$

$M_{x.polebase_{LoadCaseOT}} = 165.7 \cdot kip \cdot f \; M_{y.polebase_{LoadCaseOT}} = 0.0 \cdot kip \cdot ft \quad M_{z.polebase_{LoadCaseOT}} = 112.0 \cdot kip \cdot ft$

$M_{x.polebase_{LoadCaseCSR}} = 165.7 \cdot kip \cdot M_{y.polebase_{LoadCaseCSR}} = 314.8 \cdot kip \cdot ft \quad M_{z.polebase_{LoadCaseCSR}} = 112.0 \cdot kip \cdot ft$

Base Plate Size

$Diameter_{baseplate.pole} := Diameter_{base.pole} + 8 \cdot d_{bolt.pole}$ $\quad Diameter_{baseplate.pole} = 42 \cdot in$

$Diameter_{boltcircle.pole} := Diameter_{base.pole} + 2 \cdot (2 \cdot d_{bolt.pole})$ $\quad Diameter_{boltcircle.pole} = 34 \cdot in$

$I_{rod.group} := \frac{\#AnchorRods}{8} \cdot Diameter_{boltcircle.pole}^{2}$ $\quad I_{rod.group} = 867 \cdot in^{2}$

$S_{rod.group} := \frac{I_{rod.group}}{\frac{Diameter_{boltcircle.pole}}{2}}$ $\quad S_{rod.group} = 51 \cdot in$

Bolt Load

AASHTO anchor bolt CSR calcs not used, for future use

$$M_{csr.pole} := \frac{\sqrt{\left(M_{x.polebase_{LoadCaseCSR}}\right)^2 + \left(M_{z.polebase_{LoadCaseCSR}}\right)^2}}{C_{u.pole}}$$ LTS 5.17

$M_{csr.pole} = 200.3 \cdot kip \cdot ft$

$$T_{u.rod} := \frac{M_{csr.pole}}{S_{rod.group}}$$ $T_{u.rod} = 47.1 \cdot kip$

$$V_{csr.pole} := \sqrt{\left(V_{x.polebase_{LoadCaseCSR}}\right)^2 + \left(V_{z.polebase_{LoadCaseCSR}}\right)^2}$$ $V_{csr.pole} = 9.0 \cdot kip$

$$V_{u.rod} := \frac{V_{csr.pole}}{\#AnchorRods} + \frac{M_{y.polebase_{LoadCaseCSR}}}{\left(\frac{Diameter_{boltcircle.pole}}{2}\right) \cdot \#AnchorRods}$$ $V_{u.rod} = 38.5 \cdot kip$

$$A_{net.rod} := \frac{\pi}{4} \cdot \left(d_{bolt.pole} - \frac{0.9743}{\frac{4}{in}}\right)^2$$ $A_{net.rod} = 2.42 \cdot in^2$ LTS Eqn 5-23

$$f_{t.rod} := \frac{T_{u.rod}}{A_{net.rod}}$$ $f_{t.rod} = 19.45 \cdot ksi$

$$f_{v.rod} := \frac{V_{u.rod}}{A_{net.rod}}$$ $f_{v.rod} = 15.90 \cdot ksi$

$F_{y.rod} := 55 \cdot ksi$

$F_{t.rod} := 0.5 \cdot F_{y.rod}$ $F_{t.rod} = 27.50 \cdot ksi$ LTS Eqn 5-21

$F_{v.rod} := 0.3 \cdot F_{y.rod}$ $F_{v.rod} = 16.50 \cdot ksi$ LTS Eqn 5-22

$$CSR_{rod} := \left(\frac{f_{t.rod}}{1.33 \cdot F_{t.rod}}\right)^2 + \left(\frac{f_{v.rod}}{1.33 \cdot F_{v.rod}}\right)^2$$ $CSR_{rod} = 0.808$ LTS Eqn 5-24

Use the AISC LRFD Code, 2nd Edition, for Design of Elements Where Possible

(Design of bolts based on Design Guide for Steel to Concrete Connections by Cook, Doerr & Klingner)
(Research Report 1126-4F by the Bureau of Engineering Research at the Univ. of Texas at Austin)

$T_{u.rod.old} := 1.3 \cdot T_{u.rod}$ *(use a 1.3 load factor since loads are a mix of wind load and dead load)* $T_{u.rod.old} = 61.3 \cdot kip$

$V_{u.rod.old} := 1.3 \cdot V_{u.rod}$ $V_{u.rod.old} = 50.1 \cdot kip$

$$A_{net.rod.old} := 0.75 \cdot \pi \cdot \left(\frac{d_{bolt.pole}}{2}\right)^2$$ $A_{net.rod.old} = 2.36 \cdot in^2$

$F_{u.rod} := 75 \cdot ksi$

$T_{s.rod} := A_{net.rod.old} \cdot F_{u.rod}$ $\quad T_{s.rod} = 176.7 \cdot kip$

$\gamma := 0.5$ *(property of embedded rods)* $\quad T_{n.rod} := \sqrt{T_{s.rod}^2 - \left(\frac{V_{u.rod}}{\gamma}\right)^2}$ $\quad 0.75 \cdot T_{n.rod} = 119.3 \cdot kip$ *(if greater than actual rod tension, bolts are OK)*

$PR_{rod} := \frac{T_{u.rod.old}}{0.75 \cdot T_{n.rod}}$ $\quad PR_{rod} = 0.514$

Base Plate Thickness

Design plate thickness based on yield line theory $\quad \phi := 0.90$

$$t_{baseplate.pole.reqd} := \left[(1.3) \cdot \frac{M_{csr.pole}}{\phi} \cdot \frac{\frac{Diameter_{boltcircle.pole}}{2} - \frac{Diameter_{base.pole}}{2}}{F_{y.baseplate} \cdot \frac{Diameter_{boltcircle.pole}}{2} \cdot \frac{Diameter_{base.pole}}{2}} \right]^{\frac{1}{2}}$$

$t_{baseplate.pole.reqd} = 1.32 \cdot in$

$t_{baseplate.pole.reqd.2} := t_{baseplate.pole.reqd}$

minimum base plate thickness

$t_{baseplate.pole.reqd} := if(t_{baseplate.pole.reqd} < d_{bolt.pole}, d_{bolt.pole}, t_{baseplate.pole.reqd})$ $\quad$ LTS C5.14.2

$t_{baseplate.pole.reqd} := if(t_{baseplate.pole.reqd} < 2.5 \cdot in, 2.5 \cdot in, t_{baseplate.pole.reqd})$

$t_{baseplate.pole} := Ceil\left(t_{baseplate.pole.reqd}, \frac{1}{8} \cdot in\right)$ $\quad$ *Round up to next 1/8 inch dim.* $\quad t_{baseplate.pole} = 2.500 \cdot in$

$PR_{plate.pole} := \frac{t_{baseplate.pole.reqd}}{t_{baseplate.pole}}$

$PR_{plate.pole.2} := \frac{t_{baseplate.pole.reqd.2}}{t_{baseplate.pole}}$ $\quad$ ***Modified formula to more accurately reflect performance ratio*** $\quad PR_{plate.pole} = 0.53$

Weld Sizes of Upright to Base Plate Connection

(Design welds of the socket joint to carry 100% of the design load using an E70 electrode.).

$S_{weld.pole} := \pi \cdot \left(\frac{Diameter_{base.pole}}{2}\right)^2$ $\quad L_{weld.pole} := \pi \cdot Diameter_{base.pole}$

AISC LRFD, Vol 1, 6-A4 Specs, 2nd Ed.

$$f_{weld.pole} := \sqrt{\left(\frac{1.3 \cdot M_{csr.pole}}{S_{weld.pole}}\right)^2 + \left(\frac{1.3 \cdot V_{csr.pole}}{L_{weld.pole}} + \frac{1.3 \cdot My.polebase_{LoadCase:CSR}}{0.5 \cdot Diameter_{base.pole}^2 \cdot \pi}\right)^2}$$

$f_{weld.pole} = 7.6 \cdot \frac{kip}{in}$

$w_{bot.pole} := t_{pole} - \left(\frac{1}{16}\cdot in\right)$ $w_{bot.pole} := Ceil\left(w_{bot.pole}, \frac{1}{16}\cdot in\right)$ $w_{bot.pole} = 0.3125\cdot in$

$f_{bot.weld.pole} := w_{bot.pole}\cdot\left[(0.75)\cdot 0.6\cdot(70\cdot ksi)\cdot\left(\frac{1}{\sqrt{2}}\right)\right]$ **AISC Table J2.6** $f_{bot.weld.pole} = 7.\frac{kip}{in}$

$f_{top.weld.pole} := f_{weld.pole} - f_{bot.weld.pole}$ $f_{top.weld.pole} = 0.6\cdot\frac{kip}{in}$

$w_{top.pole} := \frac{f_{top.weld.pole}}{(0.75)\cdot(0.6)\cdot 70\cdot ksi\cdot\left(\frac{1}{\sqrt{2}}\right)}$ $w_{top.pole} := Ceil\left(w_{top.pole}, \frac{1}{16}\cdot in\right)$ $w_{top.pole} = 0.0625\cdot in$

$w_{top.pole} := if\left[\left(w_{top.pole} > t_{wall.pole}\right), w_{top.pole}, Ceil\left(t_{wall.pole}, \frac{1}{16}\cdot in\right)\right]$ $w_{top.pole} = 0.3750\cdot in$

Summary - Upright Base Plate Geometry

#AnchorRods = 6 $d_{bolt.pole} = 2\cdot in$ $t_{baseplate.pole} = 2.5\cdot in$ $Diameter_{baseplate.pole} = 42\cdot in$

Upright Base Plate Performance Ratios

$PR_{rod} = 0.514$ $PR_{plate.pole} = 0.528$

Foundation Analysis Cohesionless or Cohesive Soil

DataFile = "D6S4.dat"

Soil Properties

Current Values	New Values	
	○ Clay	
SoilType = 1	◉ Sand	*0 - clay 1 - sand*
$\phi_{soil} = 28\cdot deg$	28	*degrees, soil friction angle (sand)*
$c_{soil} = 2000\cdot psf$		*psf, soil shear strength (clay)*
$\gamma_{soil.dry} = 110\cdot pcf$	110	*pcf, dry soil weight*
$\gamma_{water} = 62.4\cdot pcf$		*pcf, water weight (zero if no water)*

$\gamma_{soil} := \gamma_{soil.dry} - \gamma_{water}$ $\gamma_{soil} = 47.60\cdot pcf$

Soil Properties

Analyze Foundation

Switch values, set values for DataOut, and Write Out Data to DataFile and Temp.dat

$out := out + 1$ $out = 35.00$

$SoilType := if(newSoilType = 0, 0, 1)$ $data_{out} := SoilType$ $data_{out} = 1.00$

$out := out + 1 \quad out = 36.00$

$\phi_{soil} := fSwitchData(\phi_{soil}, new\phi_{soil}, deg)$ $\quad data_{out} := \frac{\phi_{soil}}{deg} \quad data_{out} = 28$

$out := out + 1 \quad out = 37.00$

$c_{soil} := fSwitchData(c_{soil}, newc_{soil}, psf)$ $\quad data_{out} := \frac{c_{soil}}{psf} \quad data_{out} = 2000$

$out := out + 1 \quad out = 38.00$

$\gamma_{soil.dry} := fSwitchData(\gamma_{soil.dry}, new\gamma_{soil.dry}, pcf)$ $\quad data_{out} := \frac{\gamma_{soil.dry}}{pcf} \quad data_{out} = 110.00$

$out := out + 1 \quad out = 39.00$

$\gamma_{water} := fSwitchData(\gamma_{water}, new\gamma_{water}, pcf)$ $\quad data_{out} := \frac{\gamma_{water}}{pcf} \quad data_{out} = 62.40$

$out := out + 1 \quad out = 40.00$

$Subject := if(newSubject = 0, Subject, newSubject)$ $\quad data_{out} := Subject$

$data_{out} = "D6-S4 Mast Arm"$

$out := out + 1 \quad out = 41.00$

$ProjectNo := if(newProjectNumber = 0, ProjectNo, newProjectNumber)$ $\quad data_{out} := ProjectNo$

$data_{out} = "Design Standard"$

$out := out + 1 \quad out = 42.00$

$PoleLocation := if(newPoleLocation = 0, PoleLocation, newPoleLocation)$ $\quad data_{out} := PoleLocation$

$data_{out} = "Index 17743"$

$out := out + 1 \quad out = 43.00$

$Date := if(newDate = 0, Date, newDate)$ $\quad data_{out} := Date$

$data_{out} = "01/01/11"$

$out := out + 1 \quad out = 44.00$

$DesignedBy := if(newDesignedBy = 0, DesignedBy, newDesignedBy)$ $\quad data_{out} := DesignedBy$

$data_{out} = "FDOT"$

$out := out + 1 \quad out = 45.00$

$CheckedBy := if(newCheckedBy = 0, CheckedBy, newCheckedBy)$ $\quad data_{out} := CheckedBy$

$data_{out} = "FDOT"$

$WRITEPRN(DataFile) := data \qquad WRITEPRN("temp.dat") := data$

Foundation Design References

LRFD = AASHTO LRFD Bridge Design Specifications

SM V9 = FDOT Structures Manual Volume 9

SDG = FDOT Structures Design Guidelines

Spec = FDOT Standard Specifications

ACI = ACI 318 Structural Concrete Building Code

UF Report = FDOT/University of Florida Report BD545 RPWO #54

Applied Loads

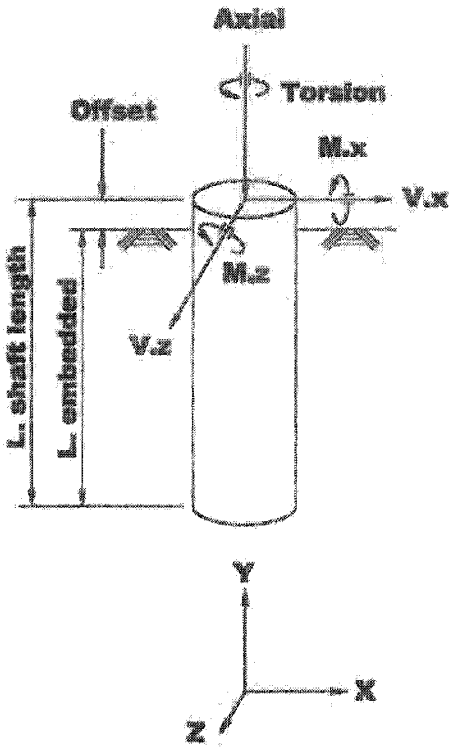
(From Arm1 Design)

WindSpeed = 130.00·mph

(from Base Plate Design)

#AnchorRods = 6.00 $d_{bolt.pole} = 2.00 \cdot in$ $Diameter_{boltcircle.pole} = 34 \cdot in$ $T_{u.rod} = 47.1 \cdot kip$

(from Upright Design)



$$M_{x.polebase} = \begin{pmatrix} 0 \\ 165.7 \\ 165.7 \end{pmatrix} \cdot kip \cdot ft \quad M_{y.polebase} = \begin{pmatrix} 314.8 \\ 0 \\ 314.8 \end{pmatrix} \cdot kip \cdot ft \quad M_{z.polebase} = \begin{pmatrix} 0 \\ 112 \\ 112 \end{pmatrix} \cdot kip \cdot ft$$

LoadCaseT = 0.00
LoadCaseOT = 1.00
LoadCaseCSR = 2.00

$$V_{x.polebase} = \begin{pmatrix} 0 \\ 0.3 \\ 0.3 \end{pmatrix} \cdot kip \quad AxialForce_{polebase} = \begin{pmatrix} 5.8 \\ 5.8 \\ 5.8 \end{pmatrix} \cdot kip \quad V_{z.polebase} = \begin{pmatrix} 0 \\ 9 \\ 9 \end{pmatrix} \cdot kip$$

Foundation Diameter

$Diameter_{shaft} := Diameter_{boltcircle.pole} + 12 \cdot in + 12 \cdot in$ $Diameter_{shaft} = 4.83 \cdot ft$

round shaft diameter up to the nearest half foot dimension to accommodate available coring equipment

$Diameter_{shaft} := Ceil\left(Diameter_{shaft}, \frac{1}{2}\cdot ft\right)$ $Diameter_{shaft} = 5.00\,ft$

$b := Diameter_{shaft}$

Shaft Depth Required to Resist Overturning

$SF_{ot} := 2$ *Safety Factor against Overturning* SM 1/9 13.6 $Offset := 0.5\cdot ft$ *vertical distance between top of foundation and groundline*

$$M_{total} := SF_{ot}\cdot\frac{\sqrt{\left(M_{x.polebase_{LoadCaseOT}}\right)^2 + \left(M_{z.polebase_{LoadCaseOT}}\right)^2}}{C_{\phi.pole}} \qquad M_{total} = 400.6\cdot kip\cdot ft$$

$$P_{total} := SF_{ot}\cdot\sqrt{\left(V_{x.polebase_{LoadCaseOT}}\right)^2 + \left(V_{z.polebase_{LoadCaseOT}}\right)^2} \qquad P_{total} = 18\cdot kip$$

short free-head pile in cohesionless soil using Broms method

$$K_p := \tan\left(45\cdot deg + \frac{\phi_{soil}}{2}\right)^2 \qquad e_{sand} := Offset$$

Guess value $L_{otSand} := 8\cdot ft$

Given $\frac{\gamma_{soil}\cdot b\cdot L_{otSand}^{\,3}\cdot K_p}{2} - P_{total}\cdot\left(e_{sand} + L_{otSand}\right) - M_{total} = 0\cdot kip\cdot ft$

$Temp := Find(L_{otSand})$ $L_{otSand} := Temp$ $L_{otSand} = 12.43\cdot ft$

(round up to next foot) $L_{otSand} := ceil\left(\frac{L_{otSand}}{ft}\right)\cdot ft$ $L_{otSand} = 13.00\,ft$

$$PR_{otSand} := \frac{M_{total} + P_{total}\cdot\left(e_{sand} + L_{otSand}\right)}{\frac{\gamma_{soil}\cdot b\cdot L_{otSand}^{\,3}\cdot K_p}{2}} \qquad PR_{otSand} = 0.89$$

short free-head pile in cohesive soil using Modified Broms method for L < 3b (see reference file for derivation)

$c_{soil} := if\left(c_{soil} = 0\cdot ksf, 0.1\cdot ksf, c_{soil}\right)$ $Slope := 8\cdot\frac{c_{soil}}{3\cdot b}$ $e_{clay} := \frac{M_{total}}{P_{total}} + Offset$

$nforce(M, N) := \left[Slope\cdot(2\cdot M + N) + 2\cdot c_{soil}\right]\cdot N\cdot\frac{b}{2}$ $mforce(M) := \left(2\cdot c_{soil} + M\cdot Slope\right)\cdot M\cdot\frac{b}{2}$

$$m\_arm(M) := e_{clay} + \frac{M}{3}\cdot\frac{2\cdot\left(M\cdot Slope + c_{soil}\right) + c_{soil}}{M\cdot Slope + 2\cdot c_{soil}}$$

$$n\_arm(M,N) := e_{clay} + M + \frac{N}{3}\cdot\frac{2\cdot(N\cdot Slope + M\cdot Slope + c_{soil}) + (M\cdot Slope + c_{soil})}{Slope\cdot(2\cdot M + N) + 2\cdot c_{soil}}$$

Guess value $M := 4.0\cdot ft$ $N := 4.0\cdot ft$

Given $P_{total} + nforce(M,N) = mforce(M)$ $mforce(M)\cdot m\_arm(M) = nforce(M,N)\cdot n\_arm(M,N)$

$\begin{pmatrix} M \\ N \end{pmatrix} := Find(M,N)$ $L_{ot1Clay.temp} := M + N$ $L_{ot1Clay.temp} = 8.42\cdot ft$

(round up to next foot) $L_{ot1Clay} := ceil\left(\frac{L_{ot1Clay.temp}}{ft}\right)\cdot ft$ $L_{ot1Clay} = 9.00\cdot ft$

short free-head pile in cohesive soil using Regular Broms method for L > 3b

$f_{clay} := \frac{P_{total}}{9\cdot c_{soil}\cdot b}$ $M_{maxtemp} := P_{total}\cdot(e_{clay} + 1.5\cdot b + 0.5\cdot f_{clay})$ $g := \sqrt{\frac{M_{maxtemp}}{2.25\cdot c_{soil}\cdot b}}$

$L_{ot2Clay} := (1.5\cdot b + f_{clay} + g)$ $L_{ot2Clay} = 12.63\,ft$

(round up to next foot) $L_{ot2Clay} := ceil\left(\frac{L_{ot2Clay}}{ft}\right)\cdot ft$ $L_{ot2Clay} = 13.00\cdot ft$

$L_{otClay} := if(L_{ot1Clay} < 3\cdot b, L_{ot1Clay}, L_{ot2Clay})$ $L_{otClay} = 9.00\cdot ft$

(If $L_{ot} < 3b$, use Modified Broms method)

$$PR_{otClay} := if\left(L_{otClay} < 3\cdot b, \frac{L_{ot1Clay.temp}}{L_{ot1Clay}}\cdot\frac{\sqrt{\frac{M_{maxtemp}}{2.25\cdot c_{soil}\cdot b}} + \frac{P_{total}}{9\cdot c_{soil}\cdot b}}{L_{ot2Clay} - 1.5\cdot b}\right)$$ $PR_{otClay} = 0.94$

$L_{reqdOT} := if(SoilType = 1, L_{otSand}, L_{otClay})$ $L_{reqdOT} = 13.00\,ft$

$PR_{ot} := if(SoilType = 1, PR_{otSand}, PR_{otClay})$ $PR_{ot} = 0.89$

Shaft Depth Required to Resist Torsion

$SF_{tor} := 1.0$ *Safety Factor against Torsion*
1.0 for Mast Arm signal structures

SM V9 13.6

NOTE: ω_{flot} and μ are based upon CONCRETE and soil interaction. This torsion methodology is not to be used with permanent casing.

$N_{blows} := 15$ *Number of blows per foot. If N< 5, contact the district geotech Engineer*

$\omega_{fdot} := if\left(N_{blows} < 5, 0, if\left(N_{blows} \geq 15, 1.5, 1.5 \cdot \frac{N_{blows}}{15}\right)\right) = 1.50$ *load transfer ratio*

$\mu := \tan(\phi_{soil}) = 0.53$ *coefficient of friction between concrete shaft and soil*

$\gamma_{concrete} := 150 \cdot pcf$ $\gamma_{concrete} := \gamma_{concrete} - \gamma_{water}$ $\gamma_{concrete} = 87.60 \cdot pcf$

$CohesionFactor := 0.55$ $f_{se} := CohesionFactor \cdot c_{soil}$

$Torsion := SF_{tor} \cdot M_{y\ polebase_{LoadCaseT}}$ $Torsion = 314.8 \cdot kip \cdot ft$

short free-head pile in cohesionless soil

Guess value $L_{torSand} := L_{reqdOT}$

Given $Torsion = \frac{\left[\pi \cdot b \cdot \left(L_{torSand}\right) \cdot \gamma_{soil} \cdot \left(\frac{L_{torSand}}{2}\right) \cdot \left(\omega_{fdot}\right) \cdot \frac{b}{2} + \pi \cdot \left(\frac{b}{2}\right)^2 \cdot L_{torSand} \cdot \left(\gamma_{concrete}\right) \cdot \frac{b}{3} \cdot \mu\right]}{SF_{tor}}$

$Temp := Find\left(L_{torSand}\right)$ $L_{torSand} := Temp$ $L_{torSand} = 14.5\ ft$

(round up to next foot) $L_{torSand} := ceil\left(\frac{L_{torSand}}{ft}\right) \cdot ft$ $L_{torSand} = 15.00\ ft$

$PR_{torSand} := \frac{Torsion \cdot SF_{tor}}{\pi \cdot b \cdot \left(L_{torSand}\right) \cdot \gamma_{soil} \cdot \left(\frac{L_{torSand}}{2}\right) \cdot \left(\omega_{fdot}\right) \cdot \frac{b}{2} + \pi \cdot \left(\frac{b}{2}\right)^2 \cdot L_{torSand} \cdot \left(\gamma_{concrete}\right) \cdot \frac{b}{3} \cdot \mu}$ $PR_{torSand} = 0.93$

short free-head pile in cohesive soil

Guess value $L_{torClay} := L_{reqdOT}$

Given $\left[f_{se} \cdot (\pi \cdot b) \cdot \left(L_{torClay} - 1.5 \cdot ft\right) \cdot \frac{b}{2}\right] + \left[f_{se} \cdot \pi \cdot \left(\frac{b}{2}\right)^2 \cdot \left(\frac{b}{3}\right)\right] = Torsion \cdot SF_{tor}$

$Temp := Find\left(L_{torClay}\right)$ $L_{torClay} := Temp$ $L_{torClay} = 7.95\ ft$

(round up to next foot) $L_{torClay} := ceil\left(\frac{L_{torClay}}{ft}\right) \cdot ft$ $L_{torClay} = 8.00\ ft$

$$PR_{torClay} := \frac{Torsion \cdot SF_{tor}}{\left[f_{se} \cdot (\pi \cdot b) \cdot \left(L_{torClay} - 1.5 \cdot ft\right) \cdot \frac{b}{2}\right] + \left[f_{se} \cdot \pi \cdot \left(\frac{b}{2}\right)^2 \cdot \left(\frac{b}{3}\right)\right]} \qquad PR_{torClay} = 0.99$$

$$L_{reqdTor} := if\left(SoilType = 1, L_{torSand}, L_{torClay}\right) \qquad L_{reqdTor} = 15.00\,ft$$

$$PR_{tor} := if\left(SoilType = 1, PR_{torSand}, PR_{torClay}\right) \qquad PR_{tor} = 0.93$$

$$L_{embedded} := if\left(L_{reqdTor} > L_{reqdOT}, L_{reqdTor}, L_{reqdOT}\right) \qquad L_{embedded} = 15.00\,ft$$

$$L_{shaft} := L_{embedded} + Offset \qquad L_{shaft} = 15.50\,ft$$

Use a 17' long drilled shaft to match Index 17743.

$L_{shaft} := 17 \cdot ft$

$$PR_{foundation} := if\left(L_{reqdTor} > L_{reqdOT}, PR_{tor}, PR_{ot}\right) \qquad PR_{foundation} = 0.93$$

$PR_{foundation} := \frac{\left(L_{reqdTor}\right)}{L_{shaft}}$ $\qquad PR_{foundation} = 0.88$

Unfactored Maximum Moment in Shaft

short free-head pile in cohesionless soil using Broms method

$$f_{sand} := \sqrt{\frac{2 \cdot \frac{P_{total}}{SF_{ot}}}{3 \cdot \gamma_{soil} \cdot b \cdot K_p}} \qquad f_{sand} = 3.02\,ft$$

$$M_{maxSand} := \frac{P_{total}}{SF_{ot}} \cdot \left(e_{sand} + f_{sand}\right) - \frac{\frac{P_{total}}{SF_{ot}} \cdot f_{sand}}{3} + \frac{M_{total}}{SF_{ot}} \qquad M_{maxSand} = 222.9\,kip \cdot ft$$

short free-head pile in cohesive soil using Modified Broms method for L < 3b (see reference file for derivation)

Guess value $f_{mod} := 4.0 \cdot ft$

Given $\qquad \frac{P_{total}}{SF_{ot}} = \frac{f_{mod} \cdot b}{2} \cdot \left(2 \cdot c_{soil} + f_{mod} \cdot Slope\right)$

$f_{mod} := Find\left(f_{mod}\right) \qquad f_{mod} = 0.75\,ft$

$$M_{modBroms} := \frac{P_{total}}{SF_{ot}} \cdot \left(e_{clay} + f_{mod}\right) - \frac{c_{soil} \cdot b \cdot f_{mod}^{\,2}}{2} - \frac{b \cdot f_{mod}^{\,3} \cdot Slope}{6} \qquad M_{modBroms} = 208.4\,kip \cdot ft$$

short free-head pile in cohesive soil using Regular Broms method for L > 3b

$$M_{Broms} := \frac{P_{total}}{SF_{ot}} \cdot \left(e_{clay} + 1.5 \cdot b + 0.5 \cdot f_{clay}\right) \qquad M_{Broms} = 273.2\,kip \cdot ft$$

$$M_{maxClay} := if\left(L_{ot\,Clay} < 3 \cdot b, M_{modBroms}, M_{Broms}\right) \qquad M_{maxClay} = 208.4\,kip \cdot ft$$

(If $L_{ot} < 3b$, use Modified Broms method)

$M_{max} := if(SoilType = 1, M_{maxSand}, M_{maxClay})$ *(this is a Service moment)* $M_{max} = 222.9\ kip \cdot ft$

Minimum Reinforcing and Spacing

$F_{y.rebar} := 60\ ksi$ *reinforcing yield strength*

$f_c := 4.0\ ksi$ *concrete strength* *Spec 346-3*

$cover := 6\ in$ *cover* *SDG Table 1.4.2-1*

$A_{bar} := 1.56\ in^2$ *longitudinal bar area*

$d_{bar} := 1.41\ in$ *longitudinal bar diameter*

$A_{v.bar} := 0.31\ in^2$ *stirrup area* *SM Y9 13.6.2*

$d_{v.bar} := 0.625\ in$ *stirrup diameter*

$s_{v1} := 4\ in$ *stirrup spacing, depth = 0 ft-2 ft* *SM Y9 13.6.2*

$s_{v2} := 8\ in$ *stirrup spacing, depth = 2 ft-depth.stir*

$s_{v3} := 12\ in$ *stirrup spacing, depth > depth.stir*

$depth_{stir} := 8.667\ ft$ *stirrup depth, see s.v2 and s.v3 above*

$b = 5.00\ ft$ *shaft diameter*

$BarsProv_1 := \frac{0.01}{A_{bar}} \cdot \frac{\pi \cdot b^2}{4}$ $BarsProv_1 = 18.12$ *LRFD 5.7.4.2*

$BarsProv_2 := \frac{0.135}{A_{bar} \cdot F_{y.rebar}} \cdot \left(\frac{\pi \cdot b^2}{4} \cdot f_c\right)$ $BarsProv_2 = 16.31$

$BarsProv := ceil\left(max\left(BarsProv_1, BarsProv_2\right)\right)$ $BarsProv = 19.00$ *number of longitudinal bars*

$BarsProv := 18$ *Use 18 bars to match index 17743.*

$NumSpaces_{v.bar} := round\left(\frac{depth_{stir} - 2 \cdot ft}{s_{v2}}\right)$ $NumSpaces_{v.bar} = 10.00$

$ReinfClearSpacing := \left[b - 2 \cdot \left(cover + d_{v.bar} + \frac{d_{bar}}{2}\right)\right] \cdot \frac{\pi}{BarsProv} - d_{bar}$ $ReinfClearSpacing = 6.5 \cdot in$

$CheckReinfClearSpacing := if(ReinfClearSpacing \geq 6in, "OK", "No Good")$ $CheckReinfClearSpacing = "OK"$

SDG 3.6.10

Check Shear and Torsion

$LF_{shr} := 1.3$	*Shear Load Factor*	*1.3 is a reasonable Load Factor for combined WL + DL on sign and signal structures*
$LF_{tor} := 1.3$	*Torsion Load Factor*	
$\phi_{shr} := 0.90$	*Shear Resistance Factor*	*LRFD 5.5.4.2.1*
$\phi_{tor} := 0.90$	*Torsion Resistance Factor*	*LRFD 5.5.4.2.1*

$$V_u := LF_{shr}\cdot\sqrt{\left(V_{x.polebase_{LoadCaseOT}}\right)^2 + \left(V_{z.polebase_{LoadCaseOT}}\right)^2} \qquad V_u = 11.7\cdot kip$$

$$T_u := LF_{tor}\cdot Torsion \qquad T_u = 409.24\cdot kip\cdot ft$$

Area and perimeter of concrete cross-section

$$A_{cp} := \pi\cdot\left(\frac{b}{2}\right)^2 \qquad A_{cp} = 2827.4\cdot in^2$$

$$p_{cp} := 2\cdot\pi\cdot\left(\frac{b}{2}\right) \qquad p_{cp} = 188.5\cdot in$$

Diameter, perimeter and area enclosed by the centerline of the outermost closed transverse torsion reinforcement

$$d_{oh} := b - 2\cdot\left(cover + \frac{d_{v.bar}}{2}\right) \qquad d_{oh} = 47.4\cdot in$$

$$p_h := \pi\cdot d_{oh} \qquad p_h = 148.8\cdot in$$

$$A_{oh} := \pi\left(\frac{d_{oh}}{2}\right)^2 \qquad A_{oh} = 1762.7\cdot in^2$$

$$A_o := 0.85\cdot A_{oh} \qquad A_o = 1498.3\cdot in^2 \qquad \textit{LRFD C5.8.2.1}$$

Effective shear depth

$$D_r := b - 2\cdot\left(cover + d_{v.bar} + \frac{d_{bar}}{2}\right) \qquad d_e := \frac{b}{2} + \frac{D_r}{\pi} = 3.70\,ft$$

LRFD C5.8.2.1

$$d_v := \max\left(0.9\cdot d_e, 0.72\cdot b\right) = 3.60\,ft$$

Check Shear Strength

$$V_c := 0.0316\cdot(2.0)\cdot\sqrt{\frac{f'_c}{ksi}}\cdot\left(\frac{d_v}{in}\right)\cdot\left(\frac{b}{in}\right)\cdot kip \qquad V_c = 327.6\cdot kip$$

LRFD Eqn 5.8.3.3-3
LRFD 5.8.3.4.1
ACI 11.3.3

$$V_s := \frac{A_{v.bar}\cdot F_{y.rebar}\cdot\left(d_v\right)}{\max\left(s_{v1}, s_{v2}, s_{v3}\right)} \qquad V_s = 67.0\cdot kip$$

LRFD Eqn 5.8.3.3-4

$\phi_{shr} = 0.90$ $V_u = 11.7 \cdot kip$

$$ShearRatio := \frac{V_u - \phi_{shr} \cdot V_c}{\phi_{shr} \cdot V_s} \qquad ShearRatio = -4.70$$

$ShearRatio := if(ShearRatio \le 0, 0, ShearRatio)$ $ShearRatio = 0.00$

Check Torsion Strength

$$T_{n1} := \frac{2 \cdot A_o \cdot A_{v.bar} \cdot F_{y.rebar}}{s_{v1}} \qquad T_{n1} = 1161.2 \cdot kip \cdot ft$$

LRFD Eqn 5.8.3.6.2-1

LRFD 5.8.3.4.1

$$T_{n2} := \frac{2 \cdot A_o \cdot A_{v.bar} \cdot F_{y.rebar}}{s_{v2}} \qquad T_{n2} = 580.6 \cdot kip \cdot ft$$

$$T_{n3} := \frac{2 \cdot A_o \cdot A_{v.bar} \cdot F_{y.rebar}}{s_{v3}} \qquad T_{n3} = 387.1 \cdot kip \cdot ft$$

$\phi_{tor} = 0.90$ $T_u = 409.24 \cdot kip \cdot ft$ $L_{reqdTor} = 15.00\,ft$

$$Tor2_{sand} := T_u - \max\left[\left[\pi \cdot b \cdot (2 \cdot ft - Offset) \cdot \gamma_{soil} \cdot \left(\frac{2 \cdot ft - Offset}{2}\right) \cdot \left(\omega_{fdot}\right) \cdot \frac{b}{2}\right], 0 \cdot kip \cdot ft\right] \qquad Tor2_{sand} = 406.1 \cdot kip \cdot ft$$

$$Tor3_{sand} := T_u - \max\left[\left[\pi \cdot b \cdot \left(depth_{str} - Offset\right) \cdot \gamma_{soil} \cdot \left(\frac{depth_{str} - Offset}{2}\right) \cdot \left(\omega_{fdot}\right) \cdot \frac{b}{2}\right], 0 \cdot kip \cdot ft\right] \qquad Tor3_{sand} = 315.7 \cdot kip \cdot ft$$

$$Tor2_{clay} := T_u - \max\left[\left[f_{se} \cdot (\pi \cdot b) \cdot (2.0 \cdot ft - Offset - 1.5 \cdot ft) \cdot \frac{b}{2}\right], 0 \cdot kip \cdot ft\right] \qquad Tor2_{clay} = 409.24 \cdot kip \cdot ft$$

$$Tor3_{clay} := T_u - \max\left[\left[f_{se} \cdot (\pi \cdot b) \cdot \left(depth_{str} - Offset - 1.5 \cdot ft\right) \cdot \frac{b}{2}\right], 0 \cdot kip \cdot ft\right] \qquad Tor3_{clay} = 121.25 \cdot kip \cdot ft$$

$Tor2 := if(SoilType = 1, Tor2_{sand}, Tor2_{clay})$ $Tor2 = 406.08 \cdot kip \cdot ft$

$Tor3 := if(SoilType = 1, Tor3_{sand}, Tor3_{clay})$ $Tor3 = 315.73 \cdot kip \cdot ft$

$$TorsionRatio_{n1} := \frac{T_u}{\phi_{tor} \cdot T_{n1}} \qquad TorsionRatio_{n1} = 0.39$$

$$TorsionRatio_{n2} := \frac{Tor2}{\phi_{tor} \cdot T_{n2}} \qquad TorsionRatio_{n2} = 0.78$$

$$TorsionRatio_{n3} := \frac{Tor3}{\phi_{tor} \cdot T_{n3}} \qquad TorsionRatio_{n3} = 0.91$$

$TorsionRatio := \max(TorsionRatio_{n1}, TorsionRatio_{n2}, TorsionRatio_{n3})$ $TorsionRatio = 0.91$

$$T_{cr} := 0.125\sqrt{\frac{f'_c}{ksi}}\cdot\left(\frac{A_{cp}^{\ 2}}{p_{cp}\cdot in^3}\right)\cdot kip\cdot in \qquad T_{cr} = 883.6\cdot kip\cdot ft$$ LRFD Eqn 5.8.2.1-4

$$TorsionRatio := if\left(T_u \le 0.25\cdot\phi_{tor}\cdot T_{cr}, 0, TorsionRatio\right)$$ TorsionRatio = 0.91 LRFD Eqn 5.8.2.1-3

ShearRatio = 0.00

CheckShearTorsion := if(ShearRatio + TorsionRatio ≤ 1, "OK", "No Good") CheckShearTorsion = "OK"

Check Maximum Spacing Transverse Reinforcement

$$vu := \frac{V_u}{\phi_{shr}\cdot b\cdot(0.8\cdot b)}$$ vu = 0.004512·ksi LRFD Eqn 5.8.2.9-1

$0.125\cdot f'_c = 0.50\cdot ksi$

$$s_{max1} := if\left(0.8\cdot d_v < 24\cdot in, 0.8\cdot d_v, 24\cdot in\right)$$ $s_{max1} = 24\cdot in$ LRFD Eqn 5.8.2.7-1

$$s_{max2} := if\left(0.4\cdot d_v < 12\cdot in, 0.4\cdot d_v, 12\cdot in\right)$$ $s_{max2} = 12\cdot in$ LRFD Eqn 5.8.2.7-2

$$s_{max} := if\left(vu < 0.125\cdot f'_c, s_{max1}, s_{max2}\right)$$ $s_{max} = 24\cdot in$

$\max(s_{v1}, s_{v2}, s_{v3}) = 12.00\cdot in$

CheckMaxSpacingTransvReinf := if(max(s_v1, s_v2, s_v3) ≤ s_max, "OK", "No Good") CheckMaxSpacingTransvReinf = "OK"

Check Longitudinal Reinforcement for Combined Shear and Torsion LRFD Eqn 5.8.3.6.3-1

LRFD 5.8.3.4.1

$$M_u := LF_{tor}\cdot\sqrt{\left(M_{x,polebase_{LoadCaseOI}}\right)^2 + \left(M_{z,polebase_{LoadCaseOI}}\right)^2}$$ $M_u = 260\cdot kip\cdot ft$

$$V_{temp} := if\left(\frac{V_u}{\phi_{shr}} - 0.5\cdot V_s > 0\cdot kip, \frac{V_u}{\phi_{shr}} - 0.5\cdot V_s, 0\cdot kip\right)$$ $V_{temp} = 0\cdot kip$

$$LongReinf_{shr,tor} := \frac{\frac{M_u}{\phi_{tor}\cdot(0.8\cdot b)} + \sqrt{\left(\frac{V_{temp}}{kip}\right)^2 + \left(\frac{0.45\cdot p_h\cdot T_u}{2\cdot A_o\cdot\phi_{tor}\cdot kip}\right)^2}\cdot kip}{f_{y,rebar}}$$ $LongReinf_{shr,tor} = 3.24\cdot in^2$

$BarsProv\cdot A_{bar} = 28.08\cdot in^2$

CheckLongReinf_shr,tor := if(BarsProv·A_bar ≥ LongReinf_shr,tor, "OK", "No Good") CheckLongReinf_shr,tor = "OK"

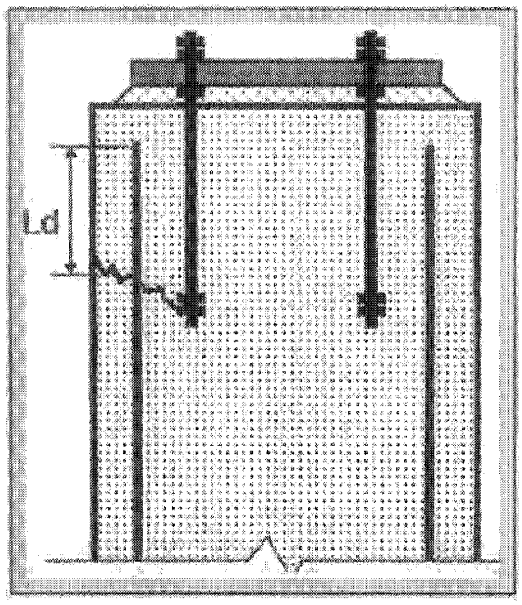
Anchor Bolt Embedment

$$Gap_{shaft} := \frac{b - 2\cdot cover - 2\cdot d_{v\_bar} - Diameter_{boltcircle.pole} - d_{bar}}{2}$$

$Gap_{shaft} = 5.67\cdot in$

$Diameter_{rebar.circle} := b - 2\cdot cover - d_{bar} - 2\cdot d_{v\_bar}$

$Diameter_{rebar.circle} = 45.3\cdot in$



$\#BarsProvided := BarsProv$ $\#BarsProvided = 18.00$

$$\#BarsProvidedPerRod := \min\left(\begin{pmatrix} \frac{\#BarsProvided}{\#AnchorRods} \\ 3 \end{pmatrix}\right)$$ *Use a maximum of three rebar per anchor bolt (conservative)* $\#BarsProvidedPerRod = 3.00$

$\phi := 0.9$ $$\#BarsReqdPerRod := \frac{T_{u.rod}}{A_{bar}\cdot(\phi\cdot F_{y.rebar})}\cdot\frac{Diameter_{boltcircle.pole}}{Diameter_{rebar.circle}}$$ $\#BarsReqdPerRod = 0.42$

$$AreaRatio := \frac{\#BarsReqdPerRod}{\#BarsProvidedPerRod}$$ $AreaRatio = 0.14$

$AreaRatio := if(AreaRatio < 1, AreaRatio, 1)$ $AreaRatio = 0.14$

$$L_{d.bar} := \max\left(\begin{bmatrix} \frac{1.25\cdot(A_{bar})\cdot F_{y.rebar}}{\sqrt{f_c\cdot ksi}\cdot in} \\ \frac{0.4\cdot(d_{bar})\cdot F_{y.rebar}}{ksi} \end{bmatrix}\right)$$ *development length of bar* LRFD 5.11.2.1.1

$$L_{d.bar} := if\left(A_{bar} = 2.25\cdot in^2, \frac{2.70\cdot in^2\cdot F_{y.rebar}}{\sqrt{f_c\cdot ksi}\cdot in}, L_{d.bar}\right)$$ $L_{d.bar} = 58.5\cdot in$

$$SpacingFactor := \max\left(\begin{pmatrix} \#BarsProvidedPerRod\cdot 0.5 - 0.5 \\ 0.5 \end{pmatrix}\right)$$ $SpacingFactor = 1.00$

$$L_{embedment.added} := \sqrt{(ReinfClearSpacing\cdot SpacingFactor)^2 + Gap_{shaft}^2}$$ $L_{embedment.added} = 8.6\cdot in$

$$L_{embedment.rod} := \max\left(\begin{bmatrix} L_{d.bar}\cdot(AreaRatio) + 12\cdot in + L_{embedment.added} \\ 20\cdot d_{bolt.pole} \end{bmatrix}\right)$$

$L_{embedment.rod} := Ceil(L_{embedment.rod}, in)$ $L_{embedment.rod} = 40 \cdot in$

$L_{anchor.rod} := Ceil[(L_{embedment.rod} + 8 \cdot in), in]$ $L_{anchor.rod} = 48 \cdot in$

Anchor Bolt Shear Break-Out Strength

References:
ACI 318-05 Appendix D.
FDOT/University of Florida Report BD545 RPWO #54,
Anchor Embedment Requirements for Signal/Sign Structures, July 2007.

#AnchorRods = 6.00 *number of anchor bolts*

$d_{bolt.pole} = 2.00 \cdot in$ *anchor bolt diameter*

$Diameter_{boltcircle.pole} = 34.00 \cdot in$ *anchor bolt circle diameter*

$L_{embedment.rod} = 40.00 \cdot in$ *anchor bolt embedment*

$b = 60.00 \cdot in$ *shaft diameter*

$r_b := \frac{Diameter_{boltcircle.pole}}{2}$ $r_b = 17.00 \cdot in$

$r := \frac{b}{2}$ $r = 30.00 \cdot in$

$c_{a1} := \frac{\sqrt{r_b^2 + 3.25 \cdot \left(r^2 - r_b^2\right)} - r_b}{3.25}$ $c_{a1} = 9.44 \cdot in$ *adjusted cover*
UF Report Eqn 3-2

$L_e := \min(8 \cdot d_{bolt.pole}, L_{embedment.rod})$ $L_e = 16.00 \cdot in$ *load bearing length of anchor for shear*
ACI D.6.2.2

$V_b := 13 \cdot \left(\frac{L_e}{d_{bolt.pole}}\right)^{0.2} \cdot \sqrt{\frac{d_{bolt.pole}}{in}} \cdot \sqrt{\frac{f'_c}{psi}} \left(\frac{c_{a1}}{in}\right)^{1.5} \cdot lbf$ *shear break-out strength (single anchor)*
UF Report Eqn 2-11

$V_b = 51.2 \cdot kip$

$A := \frac{(360 \cdot deg)}{\#AnchorRods}$ $A = 60 \cdot deg$ *UF Report Fig 3-7*

$alpha := 2 \cdot asin\left[\frac{(1.5 \cdot c_{a1})}{r}\right]$ $alpha = 56.4 \cdot deg$

$OverlapTest := if(A \le alpha, "Overlap of Failure Cones", "No Overlap of Failure Cones")$

$OverlapTest = "No Overlap of Failure Cones"$

$chord := 2 \cdot r \cdot sin\left(\frac{A}{2}\right)$ $chord = 30 \cdot in$ *UF Report Fig 3-7*

$A_{Vco} := 4.5 \cdot c_{a1}^2$ $A_{Vco} = 401.4 \cdot in^2$ *projected concrete failure area (single anchor)* *ACI Eqn D-23*

$A_{Vc} := chord \cdot 1.5 \cdot c_{a1}$ $A_{Vc} = 425 \cdot in^2$ *projected concrete failure area (group)* *ACI D.6.2.1*

$A_{Vc} := if(A_{Vc} > A_{Vco}, A_{Vco}, A_{Vc})$ $A_{Vc} = 401.4 \cdot in^2$

$\psi_{ecV} := 1.0$	*eccentric load modifier*	*ACI D.6.2.5*	
$\psi_{edV} := 1.0$	*edge effect modifier*	*ACI D.6.2.6*	
$\psi_{cV} := 1.4$	*cracked section modifier*	*ACI D.6.2.7*	*(stirrup spacing <= 4)"*
$\psi_{hV} := 1.0$	*member thickness modifier*	*ACI D.6.2.8*	
$\phi_{breakout} := 0.75$	*strength reduction factor*	*ACI D.4.4.c.i*	*(shear breakout, condition A)*

$V_{cbg} := \#AnchorRods \cdot \left(\frac{A_{Vc}}{A_{Vco}}\right) \cdot (\psi_{ecV} \cdot \psi_{edV} \cdot \psi_{cV} \cdot \psi_{hV}) \cdot V_b$ $V_{cbg} = 429.7 \cdot kip$ *concrete breakout strength - shear* *ACI Eqn D-22* *Shear force $\perp$ to edge*

$V_{cbg\_parallel} := 2 \cdot V_{cbg}$ $V_{cbg\_parallel} = 859.4 \cdot kip$ *ACI D.6.2.1.c* *Shear force $\parallel$ to edge*

$T_{n.breakout} := V_{cbg\_parallel} \cdot r_b$ $T_{n.breakout} = 1217.4 \cdot kip \cdot ft$ *concrete breakout strength - torsion*

$\phi_{breakout} \cdot T_{n.breakout} = 913.1 \cdot kip \cdot ft$

$T_u = 409.2 \cdot kip \cdot ft$

$BreakoutTest := if(\phi_{breakout} \cdot T_{n.breakout} \ge T_u, "OK", "No Good")$ $BreakoutTest = "OK"$

OverlapDesign := if(A ≤ α_s, "Based on Overlap of Failure Cones" , "Based on No Overlap of Failure Cones")

OverlapDesign = "Based on No Overlap of Failure Cones"

$$M_{x\ polebase} = \begin{pmatrix} 0.0 \\ 165.7 \\ 165.7 \end{pmatrix} \cdot kip \cdot ft \quad M_{y\ polebase} = \begin{pmatrix} 314.8 \\ 0.0 \\ 314.8 \end{pmatrix} \cdot kip \cdot ft \quad M_{z\ polebase} = \begin{pmatrix} 0.0 \\ 112.0 \\ 112.0 \end{pmatrix} \cdot kip \cdot ft$$

maximum torsion (Mx & Mz not used)
maximum overturning (My not used)
maximum CSR

Analyze Foundation

Summary - Soil Properties and Drilled Shaft Geometry

SoilType = 1 (*0 - clay, 1 - sand*) $\quad \phi_{soil} = 28 \cdot deg \quad c_{soil} = 2000 \cdot psf \quad \gamma_{soil} = 47.6 \cdot pcf$

$Diameter_{shaft} = 5\ ft \quad L_{shaft} = 17\ ft \quad L_{embedment\ rod} = 40 \cdot in \quad L_{anchor\ rod} = 48.00 \cdot in$

$\#BarsProvided = 18 \quad d_{bar} = 1.41 \cdot in$

Foundation Performance Ratios

$PR_{foundation} = 0.882$

Fatigue Analysis DataFile = "D6S4.dat" WindSpeed = 130 mph

Use the member cross section adjacent to the weld toe to compute the nominal stress range. **LTS 11.9**

FatigueCategory := 2 **SM V9 11.6**

Analyze Structure for Fatigue

Arm and Pole Welds

$f_{galloping.arm1} = 5.87 \cdot ksi$	$CAFT_{fullpengroove.weld.arm1} = 7.00 \cdot ksi$	$Check_{galloping.arm1} = "OK"$
$f_{galloping.arm2} = 0.00 \cdot ksi$	$CAFT_{fullpengroove.weld.arm2} = "NA" \cdot ksi$	$Check_{galloping.arm2} = "NA"$
$f_{galloping.pole} = 3.08 \cdot ksi$	$CAFT_{fullpengroove.weld.pole} = 4.50 \cdot ksi$	$Check_{galloping.pole} = "OK"$
$f_{nwg.arm1} = 3.75 \cdot ksi$		$Check_{nwg.arm1} = "OK"$
$f_{nwg.arm2} = 0.00 \cdot ksi$		$Check_{nwg.arm2} = "NA"$
$f_{nwg.pole} = 2.09 \cdot ksi$		$Check_{nwg.pole} = "OK"$

A325 Connection Bolts

$f_{t,g,bolt} = \begin{pmatrix} 6.9 \\ 0.0 \end{pmatrix} \cdot ksi$ $CAFT_{conn.bolt} = 16.00 \cdot ksi$ $Check_{g.conn.bolt} = \begin{pmatrix} "OK" \\ "OK" \end{pmatrix}$

$f_{t,nwg,bolt} = \begin{pmatrix} 4.4 \\ 0.0 \end{pmatrix} \cdot ksi$ $Check_{nwg.conn.bolt} = \begin{pmatrix} "OK" \\ "OK" \end{pmatrix}$

Anchor Bolts

$f_{t,g,rod} = 4.81 \cdot ksi$ $CAFT_{anchor.rods} = 7.00 \cdot ksi$ $Check_{g.rod} = "OK"$

$f_{t,nwg,rod} = 2.37 \cdot ksi$ $Check_{nwg.rod} = "OK"$

Summary

Mast Arm Design and Analysis Summary DataFile = "D6S4.dat" WindSpeed = 130 mph

Subject = "D6-S4 Mast Arm" DesignedBy = "FDOT" PoleLocation = "Index 17743"

ProjectNo = "Design Standard" CheckedBy = "FDOT" Date = "01/01/11"

1st Mast Arm

$X_{signal.arm1} = \begin{pmatrix} 24 \\ 29.5 \\ 40.5 \\ 43.5 \\ 50.5 \\ 67.5 \end{pmatrix} ft$ $Sections_{signal.arm1} = \begin{pmatrix} 3 \\ 3 \\ 3 \\ 3 \\ 3 \\ 3 \end{pmatrix}$ $Backplate_{signal.arm1} = \begin{pmatrix} 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 0 \end{pmatrix}$

$X_{panel.arm1} = \begin{pmatrix} 68.5 \\ 37.5 \\ 42.5 \\ 56.5 \end{pmatrix} ft$ $Area_{panel.arm1} = \begin{pmatrix} 9 \\ 1.56 \\ 1.56 \\ 1.56 \end{pmatrix} ft^2$

$L_{total.arm1} = 70.5\ ft$ $L_{splice.provided.arm1} = 24 \cdot in$

'EA'= 'EE'= $L_{arm1} = \begin{pmatrix} 39.4 \\ 33.1 \end{pmatrix} \cdot ft$

'FB'= 'FF'= $Diameter_{tip.arm1} = \begin{pmatrix} 9.4885 \\ 14.366 \end{pmatrix} \cdot in$

'FC'= 'FG'= $Diameter_{base.arm1} = \begin{pmatrix} 15.0045 \\ 19 \end{pmatrix} \cdot in$

'FD'= 'FH'= $t_{wall.arm1} = \begin{pmatrix} 0.1793 \\ 0.375 \end{pmatrix} \cdot in$

$\max(\Delta_{arm1}) = 10.97 \cdot in$

$\max(CSR_{arm1}) = 0.901$

2nd Mast Arm

$\#Signals_{arm2} = 0$

$\#Panels_{arm2} = 1$

$X_{signal.arm2} = (0)\ ft$

$Sections_{signal.arm2} = (0)$

$Backplate_{signal.arm2} = (0)$

$X_{panel.arm2} = (0.1)\ ft$

$Area_{panel.arm2} = (0.1)\ ft^2$

$L_{total.arm2} = 0\ ft$

$L_{splice.provided.arm2} = 24 \cdot in$

'UF'= $\alpha = 0 \cdot deg$ (Angle Between Arms)

'SA'= 'SE'= $L_{arm2} = \begin{pmatrix} 0 \\ 0 \end{pmatrix} \cdot ft$

'SB'= 'SF'= $Diameter_{tip.arm2} = \begin{pmatrix} 0 \\ 0 \end{pmatrix} \cdot in$

'SC'= 'SG'= $Diameter_{base.arm2} = \begin{pmatrix} 0 \\ 0 \end{pmatrix} \cdot in$

'SD'= 'SH'= $t_{wall.arm2} = \begin{pmatrix} 0 \\ 0 \end{pmatrix} \cdot in$

$\max(\Delta_{arm2}) = 0 \cdot in$

$\max(CSR_{arm2}) = 0$

Luminaire Arm and Connection

DataFile = "D6S4.dat"

WindSpeed = 130 mph

(use MC10x33.6 channel for connection)

'LA'= $Y_{luminaire} = 0\ ft$

'LB'= $X_{luminaire} = 0\ ft$

'LC'= $Diameter_{base.lumarm} = 0 \cdot in$

'LD'= $t_{wall.lumarm} = 0 \cdot in$

'LE'= $Slope_{lumarm} = 0$

'LF'= $n_{lumarm} = 0\ ft$

'LG'= $d_{bolt.lum} = 0 \cdot in$

'LH'= $t_{baseplate.lum} = 0 \cdot in$

'LI'= $w_{base.lum} = 0 \cdot in$

'LK'= $w_{channel.lum} = 0 \cdot in$

$CSR_{base.lumarm} = 0$

$PR_{bolt.lum} = 0$

$PR_{baseplate.lum} = 0$

$PR_{conn.plate.lum} = 0$

Upright

'UA'= $Y_{pole} = 21.5 \cdot ft$

'UB'= $Y_{arm.conn} = 20 \cdot ft$

'UC'= $Diameter_{tip.pole} = 22.99 \cdot in$

'UD'= $Diameter_{base.pole} = 26 \cdot in$

'UE'= $t_{wall.pole} = 0.375 \cdot in$

'UF'= $\alpha = 0 \cdot deg$

'UG'= $Y_{lum.conn} = 0\ ft$

$\Delta_{x.dl} = 0.57 \cdot in$

$Slope_x = 0.29 \cdot deg$

$\Delta_{x\_dl} = 0 \cdot in$ $\quad$ $Slope_x = 0 \cdot deg$ $\quad$ $C_{a\_pole} = 0.998$

$\max(CSR_{pole}) = 0.539$

1st Arm/Upright Connection

$\#ConnBolts_0 = 6$ $\quad$ 'BT' $h_{conn.plate} = 30 \cdot in$ $\quad$ 'BJ' $b_{conn.plate_0} = 36.00 \cdot in$

'BK' $t_{baseplate.arm_0} = 3 \cdot in$ $\quad$ 'BL' $t_{vertical.plate_0} = 0.75 \cdot in$

'BN' $w_{vertical.plate_0} = 0.4375 \cdot in$ $\quad$ 'BO' $Offset_{conn_0} = 22.1 \cdot in$

'BP' $d_{bolt.conn_0} = 1.25 \cdot in$ $\quad$ 'BR' $t_{conn.plate_0} = 2 \cdot in$

'BS' $Spacing_{bolts.conn_0} = 12.5 \cdot in$ $\quad$ 'BT' $w_{conn.plate_0} = 0.4375 \cdot in$

$$\begin{pmatrix} PR_{bolt_0} \\ PR_{t.baseplate.arm_0} \\ PR_{t.complate.arm_0} \\ CSR_{t.vert.plate_0} \end{pmatrix} = \begin{pmatrix} 0.848 \\ 0.804 \\ 0.874 \\ 0.65 \end{pmatrix}$$

2nd Arm/Upright Connection

$\#ConnBolts_1 = 0$ $\quad$ 'BT' $h_{conn.plate} = 30 \cdot in$ $\quad$ 'BJ' $b_{conn.plate_1} = 0.00 \cdot in$

'BK' $t_{baseplate.arm_1} = 0 \cdot in$ $\quad$ 'BL' $t_{vertical.plate_1} = 0 \cdot in$

'BN' $w_{vertical.plate_1} = 0 \cdot in$ $\quad$ 'BO' $Offset_{conn_1} = 0 \cdot in$

'BP' $d_{bolt.conn_1} = 0 \cdot in$ $\quad$ 'BR' $t_{conn.plate_1} = 0 \cdot in$

'BS' $Spacing_{bolts.conn_1} = 0 \cdot in$ $\quad$ 'BT' $w_{conn.plate_1} = 0 \cdot in$

$$\begin{pmatrix} PR_{bolt_1} \\ PR_{t.baseplate.arm_1} \\ PR_{t.complate.arm_1} \\ CSR_{t.vert.plate_1} \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \end{pmatrix}$$

Pole Baseplate

DataFile = "D6S4.dat" $\quad$ WindSpeed = 130·mph

$\#AnchorRods = 6$ $\quad$ 'BA' $Diameter_{baseplate.pole} = 42 \cdot in$ $\quad$ 'BB' $t_{baseplate.pole} = 2.5 \cdot in$

'BC' $d_{bolt.pole} = 2.00 \cdot in$ $\quad$ 'BF' $L_{embedment.rod} = 40 \cdot in$

$Diameter_{boltcircle.pole} = 34 \cdot in$

$PR_{rod} = 0.514$

$PR_{plate.pole} = 0.528$

Foundation

'DA' $L_{shaft} = 17 \cdot ft$ $\quad$ 'DB' $Diameter_{shaft} = 5 \cdot ft$ $\quad$ $d_{bar} = 1.41 \cdot in$

'BA' $round\left(\frac{d_{bar}}{0.125in}\right) = 11$ $\quad$ 'BB' $\#BarsProvided = 18$ $\quad$ $Diameter_{rebar.circle} = 3.7783\ ft$

'BC' $NumSpaces_{v.bar} = 10$ $\quad$ 'BD' $s_{v2} = 8 \cdot in$ $\quad$ $PR_{foundation} = 0.882$

WRITEPRN to Line 1-2-3

Mast Arm Tip Deflection

Compare Mast Arm deflection of each arm to a proposed camber

$Camber_{arm1} := 2 \cdot deg$ $Camber_{arm2} := 2 \cdot deg$

$L_{arm1} := \sum L_{arm1} - if\left[\left(L_{arm1_1} = 0 \cdot ft\right), 0 \cdot ft, 2 \cdot ft\right]$ $L_{arm2} := \sum L_{arm2} - if\left[\left(L_{arm2_1} = 0 \cdot ft\right), 0 \cdot ft, 2 \cdot ft\right]$

$Deflection_{arm1} := Slope_x \cdot L_{arm1} + \max\left(\Delta_{arm1}\right)$ $Deflection_{arm1} = 15.26 \cdot in$

$CamberArm1_{upward} := \sin\left(Camber_{arm1}\right) \cdot L_{arm1}$ $CamberArm1_{upward} = 29.52 \cdot in$

$Deflection_{arm2} := \left[Slope_x \cdot L_{arm2} \cdot (\sin(\alpha))\right] + Slope_x \cdot L_{arm2} \cdot \cos(\alpha) + \max\left(\Delta_{arm2}\right)$ $Deflection_{arm2} = 0 \cdot in$

$CamberArm2_{upward} := \sin\left(Camber_{arm2}\right) \cdot L_{arm2}$ $CamberArm2_{upward} = 0 \cdot in$

Check Clearance Between Connection Plates *(for Two Arm Structures only)*

$\alpha = 0.00 \cdot deg$ $\alpha_{adj} := if\left[(\alpha > 180 \cdot deg), (360 \cdot deg - \alpha), \alpha\right]$

$Offset_{conn_0} = 22.10 \cdot in$ $b_{conn\ plate_0} = 36.00 \cdot in$ $h_{conn\ plate} = 30.00 \cdot in$ $\alpha = 0.00 \cdot deg$

$Offset_{conn_1} = 0.00 \cdot in$ $b_{conn\ plate_1} = 0.00 \cdot in$

$x_1 := Offset_{conn_0} - t_{conn\ plate_0} - h_{conn\ plate} \cdot \frac{\sin\left(Camber_{arm1}\right)}{2}$ $y_1 := \frac{b_{conn\ plate_0}}{2}$ $x_1 = 19.58 \cdot in$ $y_1 = 18 \cdot in$

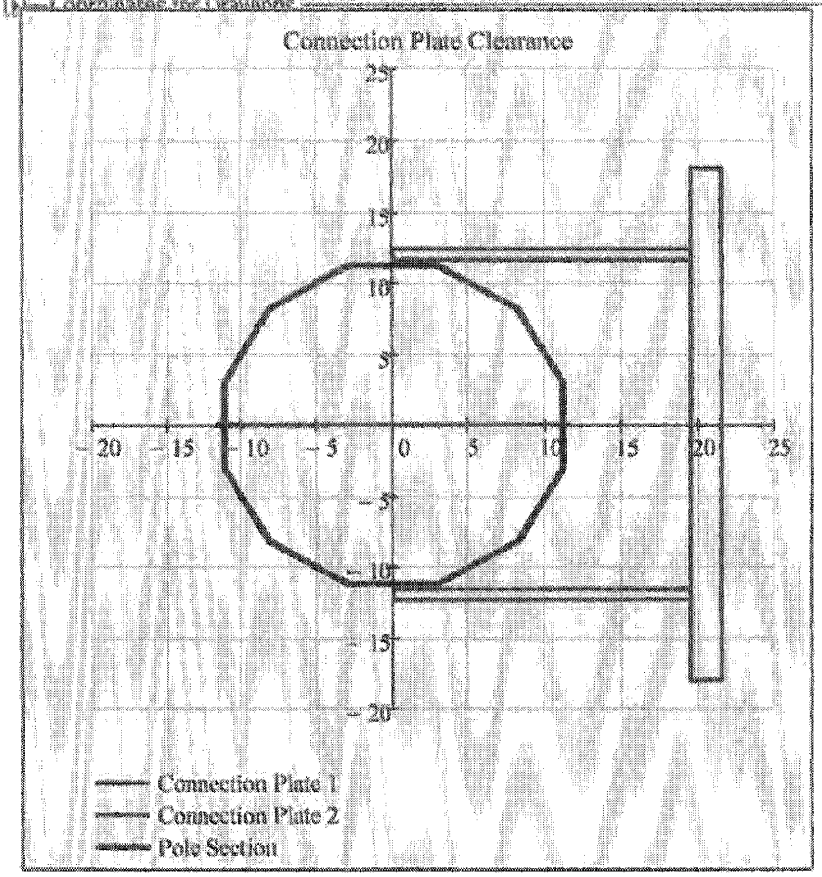
$x_2 := \left(Offset_{conn_1} - t_{conn\ plate_1} - h_{conn\ plate} \cdot \frac{\sin\left(Camber_{arm2}\right)}{2}\right) \cdot \cos(\alpha) + \frac{b_{conn\ plate_1}}{2} \cdot \sin(\alpha)$

$y_2 := \left(Offset_{conn_1} - t_{conn\ plate_1} - h_{conn\ plate} \cdot \frac{\sin\left(Camber_{arm2}\right)}{2}\right) \cdot \sin(\alpha) - \frac{b_{conn\ plate_1}}{2} \cdot \cos(\alpha)$ $x_2 = -0.52 \cdot in$ $y_2 = 0 \cdot in$

$Clearance := \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$ $Clearance_{adj} := if\left[\left(y_2 \le y_1\right), if\left[\left(x_1 > x_2\right), Clearance, 0 \cdot in\right], Clearance\right]$ $Clearance = 26.98 \cdot in$

(if Clearance equals 0, then Connection Plates intersect and redesign is required.

Plan View - Connection Plate Clearance for Two Arm Connections



$Clearance = 26.98 \cdot in$

$Diameter_{conn.pole} = 23.2 \cdot in$

$t_{conn.plate_0} = 2 \cdot in$

$b_{conn.plate_0} = 36 \cdot in$

$t_{vertical.plate_0} = 0.75 \cdot in$

$Offset_{conn_0} = 22.1 \cdot in$

$Gap_0 = 10.5 \cdot in$

$t_{conn.plate_1} = 0 \cdot in$

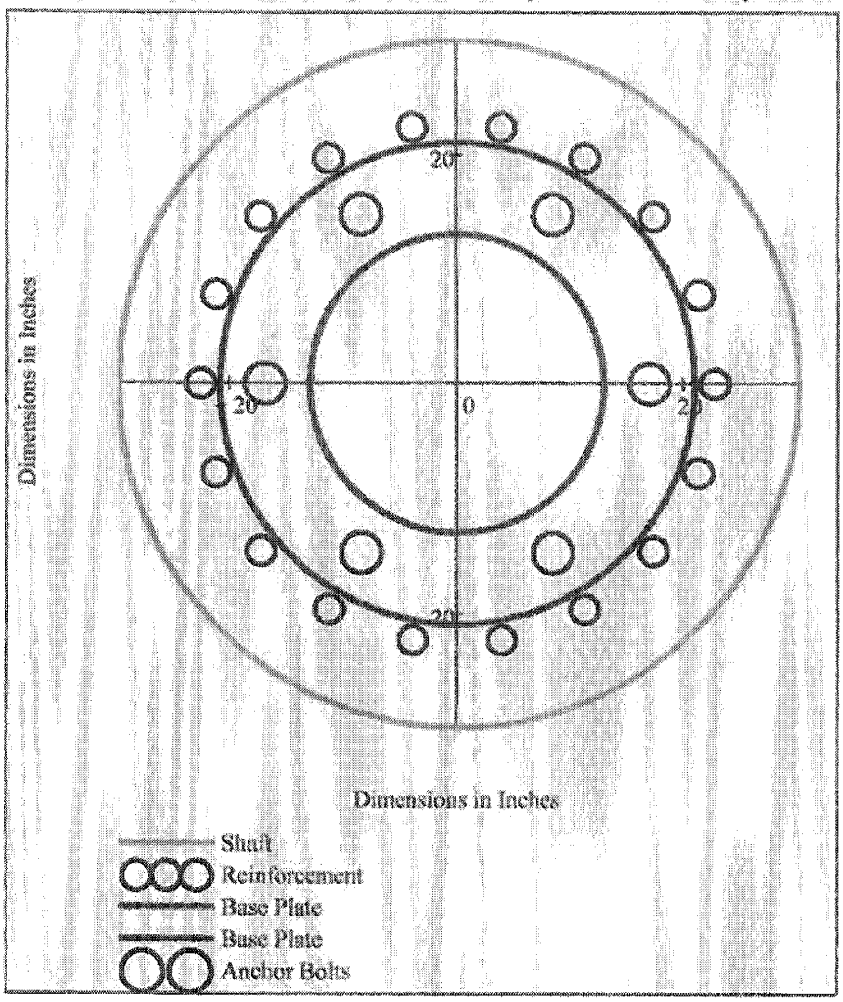
$b_{conn.plate_1} = 0 \cdot in$

$t_{vertical.plate_1} = 0 \cdot in$

$Offset_{conn_1} = 0 \cdot in$

$Gap_1 = 0 \cdot in$

Plan View - Drilled Shaft, Base Plate, Anchor Bolts, & Reinforcing Steel



$Diameter_{base.pole} = 26 \cdot in$

$Diameter_{baseplate.pole} = 42 \cdot in$

$Diameter_{shaft} = 60 \cdot in$

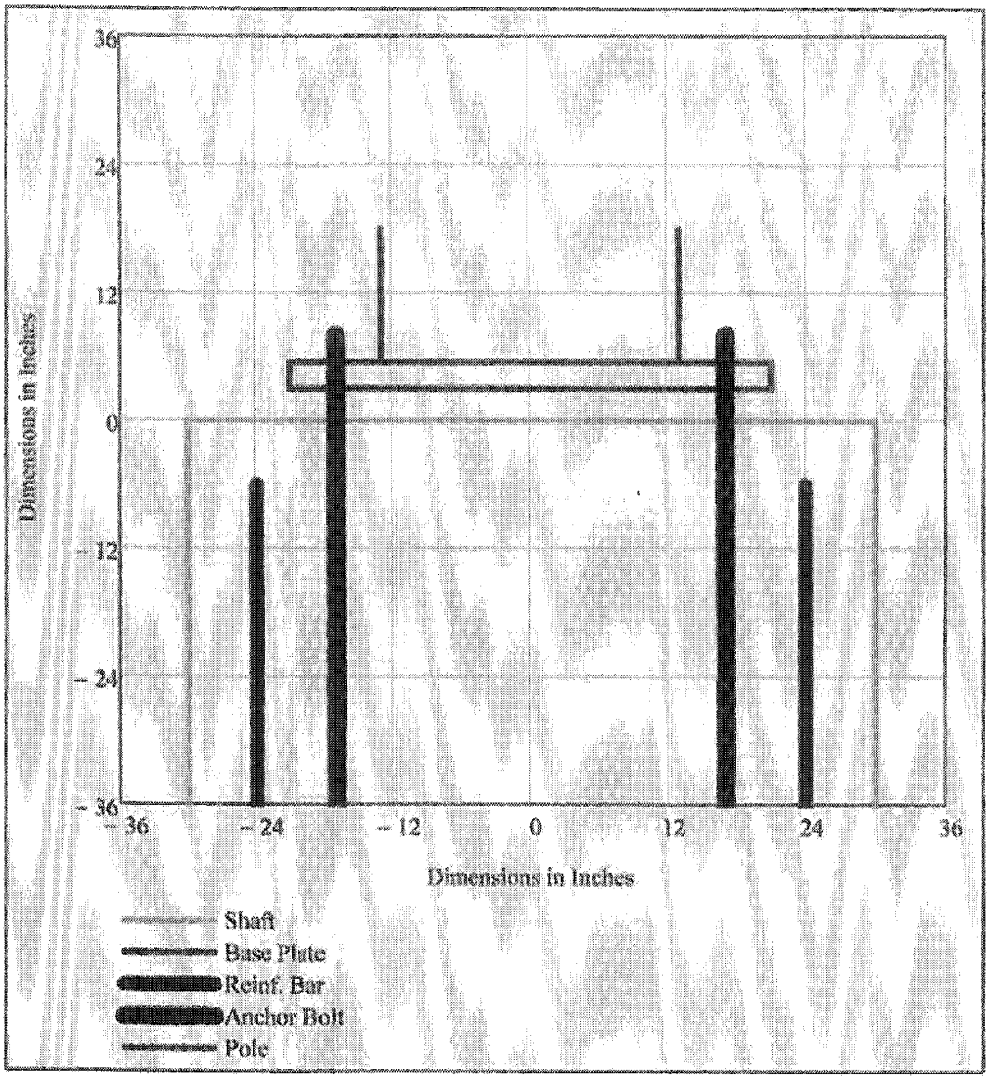
$Diameter_{boltcircle.pole} = 34 \cdot in$

$Diameter_{rebar.circle} = 45.34 \cdot in$

$\#AnchorRods = 6$

$\#BarsProvided = 18$

Elevation View - Drilled Shaft, Base Plate, Anchor Bolts, & Reinforcing Steel



$Diameter_{base.pole} = 26.00 \cdot in$

$Diameter_{baseplate.pole} = 42.00 \cdot in$

$t_{baseplate.pole} = 2.50 \cdot in$

$Diameter_{shaft} = 5.00 \cdot ft$

$Diameter_{boltcircle.pole} = 34.00 \cdot in$

$Diameter_{rebar.circle} = 45.3 \cdot in$

6.0 CADD Sheets

STANDARD MAST ARM ASSEMBLIES DATA TABLE

STRUCTURE ID NUMBERS	ASSEMBLY NUMBERS (1)	FIRST ARM			SECOND ARM			UF (deg)	LL (deg)	POLE			
		ARM TYPE	FAA (2) (ft.)	FBA (2) (in.)	ARM TYPE	FAA (2) (ft.)	FBA (2) (in.)			POLE TYPE	UAA (3) (ft.)	UB (ft.)	UC (in.
T-5	D6-S4	D6	*	*	---	---	---	---	---	S4	21.5	20.0	22.5

*STANDARD ARM AND SHAFT LENGTHS. REFER TO STANDARD MAST ARM ASSEMBLIES, INDEX NO. 17743.

TABLE NOTES:

1. Assembly Number Legend

   Single Arm:
   Arm Type - Pole Type = D# - S#
   = E# - T#

   Double Arm:
   First Arm Type - Second Arm Type - Pole Type= D# - D# - S#
   = E# - E# - T#

2. If an entry appears in columns "FAA" and "FBA", a shorter arm is required. This is obtained by removing length from the arm tip. For these cases the mast arm length shall be shortened from "FA" to "FAA" and the tip diameter shall be increased from "FB" to "FBA".

3. If an entry appears in columns "UAA" and "UCA", a shorter pole is required. This is obtained by removing length from the pole tip. For these cases the pole height shall be shortened from "UA" to "UAA" and the pole tip diameter shall be increased from "UC" to "UCA".

4. The foundations for Standard Mast Arm Assemblies are based on the Geotechnical Engineering Services Report by Dunkelberger Engineering and Testing, Inc., dated March 20, 2013. Responsible Engineer is Scott N. Parrish, P.E. No. 69091.

   The following soil parameters were used in design.

   Classification = Cohesionless (Fine Sand)
   Friction Angle = 28 Degrees (28°)

GENERAL NOTES:

1. Work this sheet with the Signal
   See "Mast Arm Tabulation" for s
   non-standard Handhole location,
   requirement, and/or pedestrian

2. Work with Index Nos. 17743 and

3. Design wind speed is 130 mph.

4. Due to the arm loading, the stru
   instead of the E6-T4 assembly