

District Five  
Design Department



Quality  
Management Plan



## Florida Department of Transportation

CHARLIE CRIST  
GOVERNOR

719 South Woodland Boulevard  
DeLand, FL 32720-6834

STEPHANIE C. KOPELOUSOS  
SECRETARY

### MEMORANDUM

**Date:** Monday, March 31, 2008

**To:** Amir Asgarinik, Ty Garner, Todd Long, Suzanne Phillips, Sarah Van Gundy, Sam Letcher, Kathy Enot, Gene Varano, Chris Dabson, Mo Hassan, Tushar Patel, Peter Merris, Brenda Young, Elizabeth Hough, Natalie Roggio, Dennisse Zornan, Heidi Trivett, Megan Reinhart, Mark Robinson, Beata Stys-Palasz, Jennifer Vreeland, Mario Bizzio, Pat Muench, Neil Kenis, Gary Bass, Joel Marmie, Don Barnhouse, Becky Bobbitt, Ed Kestory, Richard Bell, Dee Kane, Cindy Maluda, Fred Strawitch, Jim Harkrider, Yougens Pierre, Frank O'Dea, Rick Morrow, Roger Schmitt, Ron Meade, George Borchik, Suzanne Hertz, Kathy Gray, Jim Stroz

**Reference:** Copy of Design's Quality Management Plan

Attached is a copy of Design's Quality Management Plan. We have been using this process since 2004. Each discipline has a QA criteria with a critical monitoring plan. We have updated each plan, per each discipline's latest information. The one addition to the process is a certification from the Design Project Manager for QA/QC completion that is requested at each submittal.

Please contact me if you have any comments to the plan. I will maintain a binder of proposed revisions, and will update the manual periodically.

Presently we are working on placing the document on our Design website; you will be notified as soon as it is active.

If you need additional hard copies please call Myra Picallo at extension 5229.

Thank you for your input.

Sincerely,

A handwritten signature in black ink that reads "A K Brennan".

Annette K. Brennan  
District Design Engineer

**DATE:** \_\_\_\_\_

**TO:** FDOT Project Manager

**FROM:** \_\_\_\_\_, Consultant Project Manager

**COPY TO:** Richard Bell (MS 544)

**SUBJECT:** Conformance to Quality Assurance/Quality Control Plan:

Financial Project ID: \_\_\_\_\_

Federal Aid Project: Yes (choose either Yes or No from the drop down menu)

County: \_\_\_\_\_

SR No.: \_\_\_\_\_

Section No.: \_\_\_\_\_

**Conformance to Quality Control:**

The QA/QC plan that was submitted was adhered to and compliance verified.

Approved By:

Concurred By:

\_\_\_\_\_  
Signature, Engineer of Record

\_\_\_\_\_  
Consultant Project Manager (if different than EOR)

\_\_\_\_\_  
Print Name of Engineer of Record

\_\_\_\_\_  
Print Name of Consultant Firm

\_\_\_\_\_  
Date

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature, Responsible FDOT Project Manager

\_\_\_\_\_  
Date

**INDEX**

**1. INTRODUCTION**

1.1. INTRODUCTION .....2  
1.2. FLOW CHART .....3  
1.3. DEFINITION OF TERMS .....4

**2. PROCESS**

2.1. GENERAL .....6  
2.2. QUALITY ASSURANCE/QUALITY CONTROL PLAN .....7  
2.3. QA REVIEW SUBMITTAL REQUIREMENTS .....9  
2.4. QA REVIEW SUBMITTAL TRANSMITTAL LETTERS .....11  
2.5. UPDATE OF PLANS AFTER PID .....18

**3. CRITICAL MONITORING PLANS**

3.1. GENERAL .....20  
3.2. ROADWAY DESIGN .....21  
3.3. TRAFFIC CONTROL PLAN .....22  
3.4. DRAINAGE DESIGN & PERMITTING .....23  
3.5. STRUCTURES DESIGN .....28  
3.6. TRAFFIC PLANS & STANDARDS: SEE CHAPTER 4 OR  
<http://d5web.d5.state.fl.us/operations/05/index.htm> .....31  
3.7. MATERIALS & RESEARCH .....32  
3.8. MAINTENANCE .....36  
3.9. STRUCTURES & FACILITIES .....37  
3.10. UTILITIES DESIGN .....39  
3.11. SPECIFICATIONS .....40  
3.12. PAVEMENT DESIGN .....47  
3.13. INTERSTATE MANAGEMENT & CONSULTANT PROJECT MANAGEMENT .....48

**4. TRAFFIC OPERATION GUIDELINES .....49**

<http://d5web.d5.state.fl.us/operations/05/index.htm>

GUIDELINES FOR SIGNING AND PAVEMENT MARKINGS PLAN PREPARATION  
GUIDELINES FOR TRAFFIC SIGNAL PLAN PREPARATIONS

**5. CONSTRUCTABILITY REVIEWS**

<http://www.dot.state.fl.us/construction/DistrictOffices/d5webnew/SOP.htm>

5.1. CONSTRUCTABILITY REVIEW PROCESS .....50  
5.2. HOTLIST .....51  
5.3. FLOW CHART .....55  
5.4. GUIDANCE FOR USE OF CONTRACTORS ON CONSTRUCTABILITY REVIEW .....56

**6. DESIGN EXPECTATIONS (COMING ATTRACTIONS) .....57**

6.1. FOCUS ON PROJECT CONSTRAINTS  
6.2. FOCUS ON CONSTRUCTION ESTIMATES  
6.3. FOCUS ON STAKEHOLDER INVOLVEMENT

## **1. INTRODUCTION**

### **1.1. INTRODUCTION**

The Quality Management Plan (QMP) describes the methodology and procedures by which the Department ensures design documents submitted are of acceptable quality. The plan begins when the consultant is selected and the Notice to Proceed is issued. The first requirement of the QMP is for the Design Project Manager to submit a Quality Control/Quality Assurance Plan (QC/QA) to the FDOT Project Manager for both compliance to scope requirements and for acceptance by the District prior to the design work commencing. The Design Project Manager must produce a verifiable record to show that the QC/QA Plan is adhered to during all stages of the project. The FDOT Project Manger will monitor this.

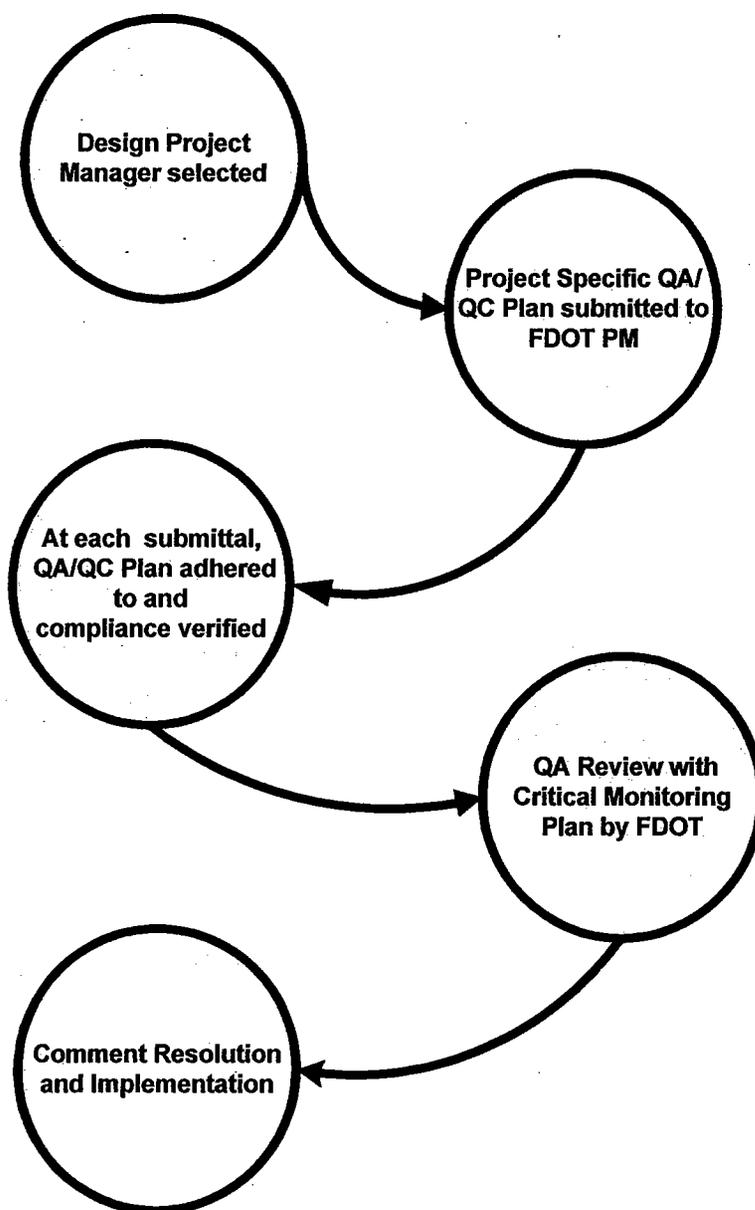
The QMP consists of a QA Review by each discipline for verification of compliance with the project scope. Each discipline has designated in this document their QA Review responsibilities. The responsibilities are outlined with general expectations and "Critical Monitoring Plans" (Hotlist). The Monitoring Plan addresses details and specialties that have caused non-compliance in the past. The intent of the Critical Monitoring Plan is to utilize Department experience to prevent or reveal issues that need additional attention and to ensure benefit to the Department and the Public.

The Department needs to ensure both economy and accuracy of design. It is imperative to assure that the plans and related documents are clear, concise, and prepared in accordance with all the appropriate regulations, standards, policies and procedures. The ability to recognize and develop the most efficient, economic and aesthetic project at a given site is a skill accrued through time and experience. Appropriate knowledge of Federal/State design and construction policies, standards and specifications procedures, etc. is also necessary to produce a quality set of plans.

**1. INTRODUCTION**

**1.2. FLOW CHART**

**Quality Management Plan (QMP)  
Flow Chart**



## 1. INTRODUCTION

### 1.3. DEFINITION OF TERMS

Design Project Manager – Consultant or In-house Project Manager that represents the design team who is in responsible charge of the subject project. Their goal is to produce a quality product on schedule and within budget. In the FDOT Design Department, the In-House Project Manager is in Roadway Design. For consultant projects the project manager is from the acquired firm.

FDOT Project Manager – Project Manager assigned by the Department to monitor, assist, and be a liaison to the Design Project Team. Their goal is to expedite the project through the FDOT process and to monitor budget and schedule. In the FDOT Design Department, this Project Manager resides in Consultant Project Management or Interstate Project Management.

Critical Monitoring Plan - This plan is specific to the designated disciplines for the review of the design documents. It consists of known problem areas that are reoccurring on similar projects. The intent of this plan is to utilize Department experience to avoid repeated problems. Details on each specific plan is shown in Chapter 3.

QC – Quality Control is a systematic approach that ensures plans, maps, calculations, documents and/or specifications are produced in accordance with project requirements, applicable design codes, design and survey standards, detailed practices and standard engineering and survey practices. This process includes as a minimum:

- detailed checking of all elements
- clear decisions and directions
- constant supervision
- immediate review of completed activities for accuracy and completeness
- documentation of all decisions, assumptions, and recommendations.
- documentation QA/AC activities

Quality Control is the responsibility of the Designer/Engineer of Record (EOR) and/or Professional Surveyor and Mapper (PSM).

QA – Quality Assurance is a systematic approach that ensures that the QC Plan is adhered to during the Design process and also provides a verifiable record of that process. Quality Assurance is the responsibility of the Design Project Manager and the firm or in-house team assigned to the project.

QMP (Quality Management Plan) – Methodology and procedures by which the Department ensures documents submitted by the Design Project Managers are of acceptable quality.

- Design Project Manager selected.
- Submittal of Quality Control/Quality Assurance Plan by Design Project Manager

- Compliance of QC/QA Plan certified by Design Project Manager and verified by FDOT Project Manager.
- QA Review by specific disciplines including Critical Monitoring Plan
- FDOT Project Manager ensure Comment Resolution Complete.
- Comment Resolution and implementation into the project.

Project Specific QA/QC Plan - This plan is established by the Design Project Manager. It is formulated specifically to the subject project. It describes the methodology and procedures by which documents are verified, independently checked, and reviewed. The QA/QC Plan will document the checking and review process and produce a verifiable record to show that the process was adhered to during the project. The plan should include:

- Project Description
- Project scope of work
- Project commitments: To whom and the commitment
- Project specific Quality Control procedures for all facets (component plans, documents, reports memorandums, etc) of project for survey, roadway, drainage, structures, misc. structures, etc.
- Prepared by the Prime Consultant, Sub-consultants and Vendors
- Project Schedule
- Contact Persons
- Quality Assurance Plan for verifying Quality Control

## 2. PROCESS

### 2.2. QUALITY ASSURANCE/QUALITY CONTROL PLAN

The Quality Assurance/Quality Control Plan (QA/QC) is the responsibility of the Design Project Manager in conjunction with the EOR and staff of the designated firm. This plan provides guidance for the District and its customers and assures the final design documents, reports and contract plans will have been developed in accordance with all applicable Department manuals, guidelines, policies and procedures, and in compliance with all applicable Federal Statutes, Regulation, Executive Orders and FHWA Directives and Standards. It provides direction for the Engineers of Record (EOR) and incorporates the District requirements into the contents of the project specific QA/QC Plan.

It is the intention of District 5 that the Engineer of Record (EOR) are held responsible for the Quality Control review of documents, reports and plans they are in responsible charge of preparing. Detailed checking of these items or assisting in designing portions of the projects is not the intent of having a Quality Assurance review. The purpose of Quality Assurance reviews, which are performed by District staff, is to ensure that plans and supporting documentation follow the plan preparation procedures outlined in the Plans Preparation Manual, that state and federal design criteria are followed and that the submittals are complete. The EORs shall be responsible for the professional quality, technical accuracy and coordination of all documents, surveys, designs, drawings, specifications and other services furnished by them. The EOR shall provide a project specific QA/QC Plan that describes the procedures to be utilized to verify, independently check, and review all maps, design drawings, specifications, and other documentation prepared for the project. It shall describe how the checking and review processes will be documented to verify that the required procedures were followed.

The EOR (in-house or consultant) shall submit the QA/QC Plan review and approval within 20 (twenty) calendar days of the written Notice to Proceed. These plans must address any project specific scope of services needs and be approved by the Project Manager or District Design Engineer as appropriate. In the "Scope of Services", all activities for the analysis and/or plans productions identify the task "Quality Assurance/Quality Control". And in the "Staff Hour Basis" for these tasks, the work effort is for the production and implementation of the QA/QC plan. All documents, reports and plans that will be prepared by the responsible EOR for their respective disciplines must be addressed in the QA/QC plan. Prior to approval of the document, a copy of the applicable portions of this document should be made available to the units (that will be receiving future submittal items) for verification that all scope issues is included. An approved copy of the complete document is to be retained in the appropriate project file. (For projects prepared by Consultants, it should be in FDOT consultant project manager's project file. For In-house projects, it should in the lead project manager's project file.) Additionally, the project manager should post an

electronic copy of this document easily accessible to all reviewers to assist the submittal reviews.

The QA/QC Plan shall include the following:

- Project Description
- Project scope of work
- Project commitments: To whom and the commitment
- Project specific Quality Control procedures for all facets (component plans, documents, reports memorandums, etc) of project for survey, roadway, drainage, structures, misc. structures, etc.
- Prepared by the Prime Consultant, Sub-consultants and Vendors
- Project Schedule
- Contact Persons
- Quality Assurance Plan for verifying Quality Control

- Project Design Controls and Design Standards
- Horizontal and vertical geometry
- Copy of Concurred Typical Section package with Variation/Exception
- Copy of Concurred Pavement Design package
- Status list of project required reports, calculations, documents, memos and where final is filed.
- Copies of correspondence, meeting minutes, results of action items, etc.
- Summary of the project specific portion of EOR's QC plan (procedure)
- Lane closure analysis
- Cost estimates

## 2. PROCESS

### 2.4. QA REVIEW SUBMITTAL TRANSMITTAL LETTERS

Each Project Manager or Engineer of Record is required to complete a phase transmittal letter when making a submittal for a Quality Assurance Review.

#### Design Submittals

Phase submittal requirements for design projects are clearly stated in the Plans Preparation Manual, Chapter 16, Topic No. 625-000-007. There are various transmittal letters--one for each required phase submittal. Each letter identifies the mail station and department requiring a submittal. The memos are formulated to provide guidance and can be altered for special, project specific, submittal requirements at the direction of the Department. They do not replace the required checklists.

**Note:** See website for any updates <http://d5web.d5.dot.state.fl.us/production/01/pm.asp>



## Florida Department of Transportation

**CHARLIE CRIST**  
GOVERNOR

Consultant Project Management  
719 S. Woodland Blvd. – MS 542  
DeLand, FL 32720-6834

**STEPHANIE KOPELOUSOS**  
SECRETARY

### INITIAL ROADWAY PLANS

|   |                                  |                |
|---|----------------------------------|----------------|
| <i>FPID</i>                                     |                                  | <i>Date</i>    |
| <i>FDOT's Project Name and Description</i>      |                                  |                |
| <i>Project Manager Name &amp; email address</i> |                                  |                |
| <i>Consultant Project Manager Name and Firm</i> |                                  |                |
| <i>State Road Number</i>                        | <i>Common Roadway Name</i>       |                |
| <i>From Mile Post</i>                           | <i>To Mile Post</i>              | <i>Section</i> |
| <i>County</i>                                   | <i>FDOT Timesheet Job Number</i> |                |

**(Please complete the above fields with your project information)**

\*\*\*\*\*

**WE ARE FORWARDING TO YOU THE FOLLOWING ITEMS FOR YOUR REVIEW AND COMMENTS:**

- |   |  |
|---|--|
| 1. Roadway Plans / Comment Responses  | 7. Geotechnical Report (Roadway & Struct.) |
| 2. Signing & Marking, Signalization, Lighting Plans   | 8. Constructability Checklist              |
| 3. Structures Plans   | 9. CD Deliverable                          |
| 4. Computation Book   | 10. Drainage Calculations                  |
| 5. QA Checklist/Plans   |  |
| 6. Design Doc /Tech Specs/Sum Pay Items/CES Printout/LRE/ Engineer's Estimate with Summary Form |  |

\*\*\*\*\*

Transmitted herewith are plans for the above project. This submittal has been entered into the Electronic Review Comments system (ERC). Please provide comments using this system only by (date). If you do not have access to the ERC system or are unfamiliar with it, please contact Heidi Trivett at the district office at 386-943-5231 or via email at [heidi.trivett@dot.state.fl.us](mailto:heidi.trivett@dot.state.fl.us). If you have any other questions, please contact the Project Manager at (phone).

\*\*\*\*\*

**MS/Dept: Items Sent - Please provide the name of the lead reviewer for each area of review expected to receive plans.**

- 544 – Checking \_\_\_\_\_ 1, 2, 5, 6, 8
- 544 – Estimates \_\_\_\_\_ 1, 2, 6, 8
- 544 – TCP Review \_\_\_\_\_ 1, 3
- 544 – Specs \_\_\_\_\_ 1, 2, 3, 6, 8
- 544 – Drainage \_\_\_\_\_ 1, 10
- 562 – Traffic Operations ( TP&S) \_\_\_\_\_ 1, 2
- 562 – Traffic Operations (Safety, Bike/Ped, Rail) \_\_\_\_\_ 1, 2, 3
- 562 – Traffic Operations (ITS) \_\_\_\_\_ 1, 2, 3
- 501 – Environmental \_\_\_\_\_ 1
- 506 – D.O. Construction (Constructability) \_\_\_\_\_ 1, 2, 3, 8, 10
- 546 – Utilities \_\_\_\_\_ 1, 2, 3
- 519 – Geotechnical \_\_\_\_\_ 1, 2, 3, 7
- 542 – Project Manager \_\_\_\_\_ 1, 2, 3, 6, 8
- 542 – Project Management Files \_\_\_\_\_ 1, 2, 3
- 510 – Maintenance \_\_\_\_\_ 1, 2
- 544 – Permits \_\_\_\_\_ 1, 2
- 538 – Structures and Facilities \_\_\_\_\_ 1, 2, 3
- 530OUO – Planning, MPO Liaison Supervisor \_\_\_\_\_ 1, 2, 3
- Public Transportation (See List)
- 545 – Structures \_\_\_\_\_ 1, 3, 7 (Structures)
- 549 – Legal, Public Record Set \_\_\_\_\_ 1, 2, 3
- LCO (Local Construction Office) \_\_\_\_\_ 1, 2, 3, 4, 6, 8
- LMU (Local Maintenance Unit) \_\_\_\_\_ 1, 2
- FHWA – full oversight only \_\_\_\_\_ 1, 2, 3, 6
- Local Municipality/As Noted Below \_\_\_\_\_ 1, 2, 3

Revised 12/18/07



## Florida Department of Transportation

**CHARLIE CRIST**  
GOVERNOR

Consultant Project Management  
719 S. Woodland Blvd. – MS 542  
Deland, FL 32720-6834

**STEPHANIE KOPELOUSOS**  
SECRETARY

District **FIVE**

Date: \_\_\_\_\_

PHASE SUBMITTAL: **30% STRUCTURE** FINANCIAL PROJECT NO. \_\_\_\_\_

TO: See Distribution List Below FROM: \_\_\_\_\_ (Proj. Mgr.)

SPN/Section: N/A SR# : \_\_\_\_\_ COUNTY: \_\_\_\_\_

DESCRIPTION/WORK MIX: \_\_\_\_\_

\*\*\*\*\*

**WE ARE FORWARDING TO YOU THE FOLLOWING ITEMS FOR YOUR REVIEW AND COMMENT:**

- |   |   |
|---|---|
| 1. Bridge Development Report (BDR)                          | 8. Bridge Inspection Report (as required) |
| 2. Bridge Development Report Checklist (PPM – Exhibit 26-A) | 9. Structure Plans                        |
| 3. Approved Typical Section Package                         | 10. Design Calculations                   |
| 4. Roadway Plans  | 11. Comment Resolution Letter             |
| 5. Bridge Hydraulics Report                                 | 12. Technical Special Provisions          |
| 6. Geotechnical Report                                      | 13. Bridge Load Rating                    |
| 7. Existing Bridge Plans (as required)                      | 14. Quantity Computation Book & CES       |

\*\*\*\*\*

Transmitted herewith are plans for the above project. Please review and comment by \_\_\_/\_\_\_/\_\_\_\_.  
All structural reviews comments are to be forwarded via e-mail to (the assigned structural resource) of the District Structures Design Office for review and compilation. The District Structures Design will forward all structural review comments to me with a copy to my Consultant, \_\_\_\_\_. Our emails are as follows: \_\_\_\_\_ and \_\_\_\_\_ . If any additional information is required, please feel free to contact me at (386) 943-\_\_\_\_ or SC 373-\_\_\_\_.

\*\*\*\*\*

**MS/Dept/Recipient: Items Sent (No. of Copies)**

- 542 – Project Manager, \_\_\_\_\_ : 9
- 545 – Structures Design, (assigned structural resource) : 6, 9 & 10
- 519 – Geotechnical, (assigned resource) : 4, 6 & 9
- 509 - Construction, (assigned resource) : 9
- 538 – Structures and Facilities, Ron Meade : 4, 9

**Category 2 Structures ONLY**

- 33 – Structures Design Office (Tallahassee), Rafiq Darji : 6, 9 & 10

**Please delete information below from transmittal letter prior to sending:**

**FHWA Submittals**

The District Structures Design Office will forward Non CA – Category 1 Structures and the State Structures Design Office will forward Non CA – Category 2 Structures submittals directly to the FHWA Division Bridge Administrator for review. FHWA review requires approximately 4 weeks and will occur after the appropriate District or Central Office review is complete. Concurrent review requires prior approval from the FHWA.

**Incomplete packages will be returned directly to the Project Manager or Consultant without review.**



## Florida Department of Transportation

**CHARLIE CRIST**  
GOVERNOR

Consultant Project Management  
719 S. Woodland Blvd. – MS 542  
DeLand, FL 32720-6834

**STEPHANIE KOPELOUSOS**  
SECRETARY

District **FIVE**

Date: \_\_\_\_\_

PHASE SUBMITTAL: **60% STRUCTURE** FINANCIAL PROJECT NO. \_\_\_\_\_

TO: See Distribution List Below FROM: \_\_\_\_\_ (Proj. Mgr.)  
SPN/Section: N/A SR# : \_\_\_\_\_ COUNTY: \_\_\_\_\_  
DESCRIPTION/WORK MIX: \_\_\_\_\_

\*\*\*\*\*

**WE ARE FORWARDING TO YOU THE FOLLOWING ITEMS FOR YOUR REVIEW AND COMMENT:**

- |   |   |
|---|---|
| 1. Bridge Development Report (BDR)                          | 8. Bridge Inspection Report (as required) |
| 2. Bridge Development Report Checklist (PPM – Exhibit 26-A) | 9. Structure Plans                        |
| 3. Approved Typical Section Package                         | 10. Design Calculations                   |
| 4. Roadway Plans  | 11. Comment Resolution Letter             |
| 5. Bridge Hydraulics Report                                 | 12. Technical Special Provisions          |
| 6. Geotechnical Report                                      | 13. Bridge Load Rating                    |
| 7. Existing Bridge Plans (as required)                      | 14. Quantity Computation Book & CES       |

\*\*\*\*\*

Transmitted herewith are plans for the above project. Please review and comment by \_\_\_/\_\_\_/\_\_\_\_.  
All structural reviews comments are to be forwarded via e-mail to (the assigned structural resource) of the District Structures Design Office for review and compilation. The District Structures Design Office will forward all structural review comments to me with a copy to my Consultant, \_\_\_\_\_. Our emails are as follows: \_\_\_\_\_ and \_\_\_\_\_.  
SC 373-\_\_\_\_\_. If any additional information is required, please feel free to contact me at (386) 943-\_\_\_\_ or SC 373-\_\_\_\_\_. Transmitted herewith are plans for the above project. Please review and comment by \_\_\_/\_\_\_/\_\_\_\_.

\*\*\*\*\*

**MS/Dept/Recipient: Items Sent (No. of Copies)**

- 542 – Project Manager, \_\_\_\_\_ : 9
- 545 – Structures Design, (assigned structural resource) : 6 & 9
- 519 – Geotechnical, (assigned resource) : 6 & 9

**Category 2 Structures ONLY**

- 33 – Structures Design Office (Tallahassee), Rafiq Darji : 6 & 9

**Please delete information below from transmittal letter prior to sending:**

**FHWA Submittals**

No FHWA review at this phase submittal.

Incomplete packages will be returned directly to the Project Manager or Consultant without review.



## Florida Department of Transportation

**CHARLIE CRIST**  
GOVERNOR

Consultant Project Management  
719 S. Woodland Blvd. – MS 542  
Deland, FL 32720-6834

**STEPHANIE KOPELOUSOS**  
SECRETARY

District FIVE

Date: \_\_\_\_\_

PHASE SUBMITTAL: 90% STRUCTURE FINANCIAL PROJECT NO. \_\_\_\_\_

TO: See Distribution List Below FROM: \_\_\_\_\_ (Proj. Mgr.)  
SPN/Section: N/A SR# : \_\_\_\_\_ COUNTY: \_\_\_\_\_  
DESCRIPTION/WORK MIX: \_\_\_\_\_

\*\*\*\*\*

**WE ARE FORWARDING TO YOU THE FOLLOWING ITEMS FOR YOUR REVIEW AND COMMENT:**

- |  |   |
|--|---|
| 1. Bridge Development Report (BDR)                           | 8. Bridge Inspection Report (as required) |
| 2. Bridge Development Report Checklist ( PPM – Exhibit 26-A) | 9. Structure Plans                        |
| 3. Approved Typical Section Package                          | 10. Design Calculations                   |
| 4. Roadway Plans   | 11. Comment Resolution Letter             |
| 5. Bridge Hydraulics Report                                  | 12. Technical Special Provisions          |
| 6. Geotechnical Report                                       | 13. Bridge Load Rating                    |
| 7. Existing Bridge Plans (as required)                       | 14. Quantity Computation Book & CES       |

\*\*\*\*\*

T Transmitted herewith are plans for the above project. Please review and comment by \_\_\_/\_\_\_/\_\_\_.  
All structural reviews comments are to be forwarded via e-mail to (the assigned structural resource) of the District Structures Design Office for review and compilation. The District Structures Design Office will forward all structural review comments to me with a copy to my Consultant, \_\_\_\_\_. Our emails are as follows: \_\_\_\_\_ and \_\_\_\_\_.  
If any additional information is required, please feel free to contact me at (386) 943-\_\_\_\_\_ or SC 373-\_\_\_\_\_.

\*\*\*\*\*

**MS/Dept/Recipient: Items Sent (No. of Copies)**

- 542 – Project Manager, \_\_\_\_\_ : 9
- 545 – Structures Design, (assigned structural resource) : 4, 6, 9, 10, 11, 12, 13 & 14
- 519 – Geotechnical, (assigned resource) : 4, 6, 9, 11, 12 (if applicable) & 14 (CES Only)
- 506 - Construction, (assigned resource) : 4, 9, 11, 12, 14
- 538 – Structures and Facilities, Ron Meade : 4, 9, 11, 12 (if applicable), 13 & 14
- 544 – Estimates, James Taylor : 9, 11 & 12

**Category 2 Structures ONLY**

- 33 – Structures Design Office (Tallahassee), Rafiq Darji : 4, 6, 9, 10, 11, 12, 13 & 14
- Please delete information below from transmittal letter prior to sending:**

**FHWA Submittals**

The District Structures Design Office will forward Non CA – Category 1 Structures and the State Structures Design Office will forward Non CA – Category 2 Structures submittals directly to the FHWA Division Bridge Administrator for review. FHWA review requires approximately 4 weeks and will occur after the appropriate District or Central Office review is complete. Concurrent review requires prior approval from the FHWA.  
**Incomplete packages will be returned directly to the Project Manager or Consultant without review.**

## **2. PROCESS**

### **2.5. UPDATE OF PLANS AFTER PLANS IN DISTRICT (PID)**

The plans update phase will be a joint effort involving coordination with several disciplines throughout the Department. The lead person will be the assigned FDOT Project Manager.

The FDOT Project Manager shall review the contract plans and contract file to determine all activities required to update the project and prepare it for letting. Based on this cursory review, the FDOT Project Manager will update the project schedule prior to the update engineering phase to ensure that all necessary line items are included. The schedule will also be reviewed for each item's duration to be commensurate with the level of effort required during the update phase.

The typical length of time for an update phase can range from 4-15 months. In special circumstances, the update phase may exceed the 15 month timeframe. Several factors can influence the length of time for an update, including available funding, PID duration, scope additions/deletions/modifications, existing condition changes, etc. The FDOT Project Manager will evaluate all factors when creating the schedule for the update phase to ensure that adequate time is programmed to accomplish the required tasks.

On consultant design projects, the FDOT Project Manager will initiate contact with the Consultant Project Manager to coordinate preparation of the scope and staff-hour estimates. During this coordination effort, the consultant will review the schedule and work with the FDOT Project Manager to finalize the activities. On in-house design projects, the Project Manager will develop a scope of work detailing the actual engineering design effort and identify required resources required to update the plans package for letting.

The actual design effort will include, but not limited to, the following:

- Updating the component plan sets to current design standards and conditions.
- Updating Special Provisions and Technical Specifications.
- Update CADD files to current criteria.
- Update pay items and quantities.
- Update, modify, or extend permit, if required.
- Re-contact Utility Agencies and update plans with latest utility information.
- Update contract file.

**AUTHORITY:**

**FEDERAL:**

- (1) Title 23 United States Code (USC) 106

**STATE**

- (1) Florida Statutes Section 20.23(3)(a)
- (2) Florida Statutes Section 334.048

**REFERENCES:**

- (1) Exemption Agreement and 23 USC 106 Exception Process, topic No. 700-000-020-g, dated April 6, 2005
- (2) The 2007 Florida Statutes Chapter 20, Organization Structure
- (3) The 2007 Florida Statutes Chapter 334, Transportation Administration
- (4) The Florida Department of Transportation, January 2006 Plans Preparation Manuals (PPM), Third Edition, Revised – January 1, 2008
  - (4.1) PPM Volume 1, Design Criteria and Process, Topic No. 625-000-007
  - (4.2) PPM Volume II, Plans Preparation and Assembly, Topic No. 625 000-008
- (5) Standard Scope and Staff Hour Estimating Guidelines for Project Development and Environment (PD&E) Studies and Design Services, Topic No. 375-30-020-d, dated May 19, 2005
  - (5.1) Standard Scope and Staff Hour Estimation Guidelines for Road way & Bridge/Structural Design – Standard Scope, 9/12/07 Edition
  - (5.2) Standard Scope and Staff Hour Estimation Guidelines for Road way & Bridge/Structural Design – Staff Hour Basis, 9/12/07 Edition

### **3. CRITICAL MONITORING PLANS**

#### **3.1. GENERAL**

This section provides insight toward the QA review with the specific Critical Monitoring Plans for each discipline.

As stated in the introduction, the Critical Monitoring Plans/Hotlist addresses details and specialities that have caused non-compliance in the past. Its intent is to utilize Department experience to prevent or reveal issues that may need additional attention.

| EOR QC/QA review   | FDOT QADS Review | Support Documentation | NTP + 20 DAYS | Phase I (30%) review | Phase II (60%) review | Phase III (90%) review | Phase IV (100%) review | Update review |  |   |
|--|------------------|-----------------------|---------------|----------------------|-----------------------|------------------------|------------------------|---------------|--|---|
| <b>LEGEND:</b>   |                  |                       |               |                      |                       |                        |                        |               |  |   |
| y = yes, n = no, S = support documentation to assist the review,   |                  |                       |               |                      |                       |                        |                        |               |  |   |
| Status Key from January 2006 PPM, Vol II, Fig 2.1(revised January 1, 2008):<br>P = Preliminary; C = Complete but subject to change; F = Final; U = Updated                         |                  |                       |               |                      |                       |                        |                        |               |  |   |
| <b>COMPONENT TYPE/SHEET TYPE/REVIEW ELEMENT</b>  |                  |                       |               |                      |                       |                        |                        |               |  |   |
| <b>ROADWAY QA REVIEW</b>   |                  |                       |               |                      |                       |                        |                        |               |  |   |
| y  | n                | y                     | y             | y                    | y                     | y                      | y                      | y             |  | Transmittal Letter with list of deliverables  |
| y  | y                | y                     | y             |                      |                       |                        |                        |               |  | Project Specific Quality Control Plan   |
| y  | y                | y                     |               | y                    | y                     | y                      | y                      | y             |  | Contract Plans (all required components for phase submittal)  |
| y  | y                | y                     |               | y                    | y                     | y                      | y                      | y             |  | EOR's marked-up phase submittal QC set of plans and/or EOR's checklist(s) with Designer's responses   |
| y  | y                | y                     |               | y                    | y                     | y                      | y                      | y             |  | Design Documentation (as information becomes available)   |
| y  | y                | y                     |               |                      | y                     | y                      | y                      | y             |  | Marked up plans from prior review submittal and the comments with EOR's responses (all disciplines) with Resolution Letter  |
| y  | y                | S                     | y             | y                    | y                     | y                      | y                      | y             |  | Major changes since previous submittal (as an attachment to transmittal letter or sheet 1A "Notes to Reviewers")  |
| The following items marked with * are from the 2008 Revised PPM, Volume I and (b) = Pg 18-4 "Sealing Other Engineering Documents"; (c) = Pg 24-4 "Certification Responsibilities". |                  |                       |               |                      |                       |                        |                        |               |  |   |
| y  |                  | S                     |               |                      |                       |                        |                        |               |  | *Typical Section Package (b & c)  |
| y  |                  | S                     |               |                      |                       |                        |                        |               |  | *Design Exceptions and Variations (b & c)   |
| y  |                  | S                     |               |                      |                       |                        |                        |               |  | *Pavement Design Package (b & c)  |
| y  |                  |                       |               |                      |                       |                        |                        |               |  | *Hydraulics Reports (b & c)   |
| y  |                  |                       |               |                      |                       |                        |                        |               |  | *Drainage Computations (b)  |
| y  |                  |                       |               |                      |                       |                        |                        |               |  | *Bridge Development Report (b & c)  |
| y  |                  |                       |               |                      |                       |                        |                        |               |  | *Traffic Engineering Reports and Recommendations (b)  |
| y  |                  |                       |               |                      |                       |                        |                        |               |  | *Environmental Reports and Recommendations (b)  |
| y  |                  |                       |               |                      |                       |                        |                        |               |  | *Soil Survey Reports and Geotechnical Report (b)  |
| y  |                  |                       |               |                      |                       |                        |                        |               |  | *Value Engineering Record (b)   |
| y  |                  |                       |               |                      |                       |                        |                        |               |  | *Permit Documentation (b)   |
| y  |                  |                       |               |                      |                       |                        |                        |               |  | *Design Exceptions for Utilities prepared by an Engineering Consultant (b)  |
| y  | y                |                       |               |                      |                       |                        |                        |               |  | *Design Plans Phase Reviews (c)   |
| y  |                  | S                     |               |                      |                       |                        |                        |               |  | *Other Engineering Reports (b)  |
| y  |                  |                       |               |                      |                       |                        |                        |               |  | *Specifications and Special Provisions (b & c)  |
| y  |                  |                       |               |                      |                       |                        |                        |               |  | *Plans, Specifications and Estimates (c)  |
| y  |                  |                       |               |                      |                       |                        |                        |               |  | *Authorization to Advertise (c)   |
| y  |                  |                       |               |                      |                       |                        |                        |               |  | *Revisions (c)  |
| <b>Roadway Component:</b>  |                  |                       |               |                      |                       |                        |                        |               |  |   |
| <b>General</b>   |                  |                       |               |                      |                       |                        |                        |               |  |   |
| y  | y                |                       |               | y                    | y                     | y                      | y                      | y             |  | Spot check for compliance with 2008 Basis of Estimates Handbook, dated January 16, 2008 & Mid-year updates.   |
| y  | y                |                       |               | y                    | y                     | y                      | y                      | y             |  | Spot check for compliance with Current "Estimates Bulletins".   |
| y  | y                |                       |               | y                    | y                     | y                      | y                      | y             |  | Spot check for compliance with Roadway Design Bulletin 07-07, 2008 Design Standards - Implementation.   |
| y  | y                |                       |               | y                    | y                     | y                      | y                      | y             |  | Spot check for compliance with Roadway Design Bulletin 08-03, 2008 Design Standards Modifications effective July 1, 2008.   |
| y  | y                |                       |               | y                    | y                     | y                      | y                      | y             |  | Spot check for compliance with Current Structural "Temporary Design Bulletins".   |
| y  | y                |                       |               | P                    | P                     | C                      | F                      | U             |  | <b>Key Sheet</b>  |
| y  | y                |                       |               |                      | y                     |                        | y                      |               |  | Projects having railroad crossings are designated by flagging the DOT/AAR crossing number, railroad milepost, name of railroad, and the highway project station number on the Key Map.  |
| y  | y                |                       |               |                      | y                     | y                      | y                      |               |  | Spot check Key sheet for compliance to PPM vol II requirements: financial project Id & section numbers, list and order of components & sheets, correct year for Specifications Design Standards, web site for Interim Standards, location map labeling, correct Fiscal Year & strung projects shown, etc. |
| y  | y                |                       |               |                      | y                     | y                      | y                      |               |  | If required for project; inclusion of structural standards indexes and/or "for information only" sheets. (Existing bridge sheets are to be included in the structure plans.)  |

| EOB QC/QA review   | FDOT QADS Review | Support Documentation | NTP + 20 DAYS | Phase I (30%) review | Phase II (50%) review | Phase III (90%) review | Phase IV (100%) review | Update review |  |   |
|--|------------------|-----------------------|---------------|----------------------|-----------------------|------------------------|------------------------|---------------|--|---|
| <b>LEGEND:</b>   |                  |                       |               |                      |                       |                        |                        |               |  |   |
| y = yes, n = no, S = support documentation to assist the review,   |                  |                       |               |                      |                       |                        |                        |               |  |   |
| Status Key from January 2006 PPM, Vol II, Fig 2.1(revised January 1, 2008):<br>P = Preliminary; C = Complete but subject to change; F = Final; U = Updated |                  |                       |               |                      |                       |                        |                        |               |  |   |
| <b>COMPONENT TYPE/SHEET TYPE/REVIEW ELEMENT</b>  |                  |                       |               |                      |                       |                        |                        |               |  |   |
| y  | y                |                       |               |                      | y                     | y                      | y                      |               |  | Verify projects with railroad crossings are designated by flagging the DOT/AAR crossing number, railroad milepost, name of railroad, and the highway project station number.  |
| y  | n                | S                     |               |                      | P                     | C                      | F                      | U             |  | <b>Summary of Pay Items (to be reviewed by Estimates)</b>   |
|  |                  |                       |               |                      |                       |                        |                        |               |  | spot check conformance to PPM requirements  |
| y  | n                | S                     |               | P                    | P                     | C                      | F                      | U             |  | <b>Drainage Map (to be reviewed by Drainage)</b>  |
|  |                  |                       |               |                      |                       |                        |                        |               |  | spot check conformance to PPM requirements  |
| y  | n                | S                     |               | P                    | P                     | C                      | F                      | U             |  | <b>Interchange Drainage Map (Review by Drainage)</b>  |
|  |                  |                       |               |                      |                       |                        |                        |               |  | spot check conformance to PPM requirements  |
| y  | y                |                       |               | P                    | C                     | C                      | F                      | U             |  | <b>Typical Sections</b>   |
| y  | y                |                       |               | y                    | y                     | y                      |                        |               |  | Compare plans Typical Section(s) to approved and concurred typical section package.   |
| y  | y                |                       |               | y                    | y                     | y                      |                        |               |  | Spot check supplemental details (half or partial sections).   |
| y  | y                |                       |               | y                    | y                     | y                      |                        |               |  | Compare plans Pavement Structure descriptions(s) to approved and concurred pavement design package verify thickness is express to current requirements.   |
| y  | y                |                       |               | y                    | y                     | y                      |                        | y             |  | Spot check typical sections for adequate dimensioning covering the entire length of project, complete traffic data that matches pavement design package, design speed.  |
| y  | y                |                       |               | y                    | y                     | y                      | y                      |               |  | Check milling/resurfacing typical section(s) for cross slope correction. If required, milling and/or overbuild details showing control point, milling depth at control point, milling slope, overbuild layer, etc should be shown.  |
| y  | y                |                       |               | y                    | y                     | y                      | y                      |               |  | Verify only project specific Typical Section notes are shown.   |
| y  | n                | S                     |               |                      |                       | C                      | F                      | U             |  | <b>Summary of Quantities (to be reviewed by Estimates and Construction)</b>   |
| y  | y                |                       |               |                      | y                     | y                      | y                      |               |  | Spot check complies with current annual Basis of Estimates Handbook Update and the mid-year update changes.   |
| y  | y                |                       |               |                      | y                     | y                      | y                      |               |  | Spot check appropriate Summaries are included.  |
| y  | n                | S                     |               |                      |                       | C                      | F                      | U             |  | <b>Box Culvert Data Sheet (reviewed by Drainage and Structures)</b>   |
| y  | n                | S                     |               |                      |                       | C                      | F                      | U             |  | <b>Summary of Drainage Structures (to be reviewed by Drainage)</b>  |
|  |                  |                       |               |                      |                       |                        |                        |               |  | spot check compliance to PPM requirements   |
| y  | n                | S                     |               |                      | P                     | C                      | F                      | U             |  | <b>Optional Materials Tabulation (to be reviewed by Drainage)</b>   |
|  |                  |                       |               |                      |                       |                        |                        |               |  | spot check compliance to PPM requirements   |
| y  | n                | S                     |               | P                    | C                     | C                      | F                      | U             |  | <b>Project Layout</b>   |
| y  | y                |                       |               | y                    |                       |                        | y                      |               |  | Spot check alignment, curve data and includes value for super elevation.  |
| y  | y                |                       |               | P                    | P                     | C                      | F                      | U             |  | <b>Plan/Profiles</b>  |
| y  | y                |                       |               | y                    | y                     | y                      | y                      |               |  | Verify only project specific General Notes are shown.   |
| y  | y                |                       |               | y                    | y                     | y                      | y                      |               |  | Spot check curve data and includes value for super elevation.   |
| y  | y                |                       |               | y                    | y                     | y                      | y                      |               |  | Spot check and verify existing, proposed and/or extended concrete box culverts (single or multiple barrel) of 20' total span or more between inside faces of end supports (measured along the center of the roadway) are designated as bridge culverts, have both bridge number and drainage structure number.                              |
| y  | y                |                       |               | y                    | y                     | y                      | y                      |               |  | Spot check pedestrian features: at the termini of urban projects for continuity of pedestrian accommodations, if not provided is reduced form as an interim measure provided; curb and gutter resurfacing projects are to be retrofitted to provide public access ramps: plans should show alpha-numeric identifiers at each ramp location. |
| y  | y                |                       |               | P                    | P                     | C                      | F                      | U             |  | <b>Special Profiles</b>   |
| y  | y                |                       |               | y                    | y                     | y                      | y                      |               |  | Spot check conformance to PPM requirements.   |
| y  | y                |                       |               | P                    | C                     | C                      | F                      | U             |  | <b>Back-of-Sidewalk Profiles</b>  |
| y  | y                |                       |               | y                    | y                     | y                      | y                      |               |  | Spot check conformance to PPM requirements.   |
| y  | y                |                       |               | P                    | P                     | C                      | F                      | U             |  | <b>Interchange Layout</b>   |
| y  | y                |                       |               | y                    | y                     | y                      | y                      |               |  | Spot check conformance to PPM requirements.   |
| y  | y                |                       |               |                      | P                     | C                      | F                      | U             |  | <b>Ramp Terminal Details</b>  |
| y  | y                |                       |               | y                    | y                     | y                      | y                      |               |  | Spot check conformance to PPM requirements.   |
| y  | y                |                       |               | P                    | P                     | C                      | F                      | U             |  | <b>Intersection Layout/Details</b>  |
| y  | y                |                       |               | y                    | y                     | y                      | y                      |               |  | Spot check conformance to PPM requirements.   |
| y  | n                | S                     |               |                      |                       |                        |                        |               |  | <b>Drainage Structures (to be reviewed by Drainage)</b>   |

| EOR QC/QA review   | FDOT QADS Review | Support Documentation | NTP + 20 DAYS | Phase I (30%) review | Phase II (50%) review | Phase III (90%) review | Phase IV (100%) review | Update review |  |
|--|------------------|-----------------------|---------------|----------------------|-----------------------|------------------------|------------------------|---------------|--|
| <b>LEGEND:</b>   |                  |                       |               |                      |                       |                        |                        |               |  |
| y = yes, n = no, S = support documentation to assist the review,   |                  |                       |               |                      |                       |                        |                        |               |  |
| Status Key from January 2006 PPM, Vol II, Fig 2.1(revised January 1, 2008):<br>P = Preliminary; C = Complete but subject to change; F = Final; U = Updated |                  |                       |               |                      |                       |                        |                        |               |  |
| <b>COMPONENT TYPE/SHEET TYPE/REVIEW ELEMENT</b>  |                  |                       |               |                      |                       |                        |                        |               |  |
| y  | y                |                       |               | y                    | y                     |                        | y                      |               | Drainage structure boxes spot checked for pipes that exceed maximum sizes shown on applicable Indexes. If pipe size exceeds the maximum for a particular structure box, call for a J-box. Consider the effect of skewed pipes on required box sizes. |
| y  | y                |                       |               | y                    | y                     |                        | y                      |               | Spot check "Special" drainage structures for conformance with BOE and detailed design plans for the "Special" structures are included.   |
| y  | y                |                       |               | y                    | y                     |                        | y                      |               | Spot check grate or slot elevations of proposed drainage structures that are to be placed in existing ditches or swales are compatible with existing elevations.   |
| y  | n                | S                     |               | P                    | C                     | F                      | U                      |               | <b>Three Sided/Box Culvert Details ( reviewed by Drainage and Structures)</b>  |
| y  | y                |                       |               | y                    | y                     |                        | y                      |               | Spot check conformance to PPM requirements.  |
| y  | n                | S                     |               | P                    | C                     | F                      | U                      |               | <b>Lateral Ditch Plan-Profile (to be reviewed by Drainage)</b>   |
| y  | y                |                       |               | y                    | y                     |                        | y                      |               | Spot check conformance to PPM requirements.  |
| y  | n                | S                     |               | P                    | C                     | F                      | U                      |               | <b>Lateral Ditch Cross Sections ( reviewed by Drainage)</b>  |
| y  | y                |                       |               | y                    | y                     |                        | y                      |               | Spot check conformance to PPM requirements.  |
| y  | y                |                       |               | P                    | C                     | F                      | U                      |               | <b>Retention/Detention Ponds (review by Drainage)</b>  |
|  |                  |                       |               |                      |                       |                        |                        |               | Spot check conformance to PPM requirements.  |
| y  | y                |                       |               | P                    | C                     | F                      | U                      |               | <b>Special Details</b>   |
| y  | y                |                       |               | y                    | y                     |                        | y                      |               | Spot check conformance to PPM requirements.  |
| y  | n                | S                     |               | P                    | C                     | F                      | U                      |               | <b>Cross Section Pattern</b>   |
| y  | y                |                       |               | y                    | y                     |                        | y                      |               | Spot check conformance to PPM requirements.  |
| y  | n                | S                     |               | P                    | C                     | F                      | U                      |               | <b>Roadway Soil Survey (review by Material &amp; Research)</b>   |
| y  |                  |                       |               |                      |                       |                        |                        |               | Spot check conformance to PPM requirements.  |
| y  | y                |                       |               | P                    | P                     | C                      | F                      | U             | <b>Cross Sections</b>  |
| y  | y                |                       |               | y                    | y                     | y                      | y                      |               | Spot check conformance to PPM requirements.  |
| y  | y                |                       |               | y                    | y                     | y                      | y                      |               | Verify Summary of Earthwork Box, includes all earthwork items and is shown in accordance with the PPM.   |
| y  | y                |                       |               | y                    | y                     | y                      | y                      |               | Spot Check cross sections to determine if limits of construction fall outside of R/W or easement limits.   |
| y  | y                |                       |               | y                    | y                     | y                      | y                      |               | Spot check cross sections for soil strata requiring special consideration and treatment (should be identified and limits clearly defined), earthwork items calculated in accordance with the requirements of the PPM and appropriate pay items used. |
| y  | y                |                       |               | y                    | y                     | y                      | y                      |               | Spot check plans for driveway half sections.   |
| y  | y                |                       |               | y                    | y                     | y                      | y                      |               | Spot check water retention pond(s) cross sections are at appropriate stations (the end areas should be at all stations where end areas change) in order to provide a truer earthwork volume.   |
| y  | n                | S                     |               | P                    | C                     | F                      | U                      |               | <b>Stormwater Pollution Prevention Plan (review by Permit Coordinator)</b>   |
| y  | y                |                       |               | y                    | y                     |                        | y                      |               | Spot check conformance to PPM requirements.  |
| y  | y                |                       |               | P                    | P                     | C                      | F                      | U             | <b>Traffic Control Plans</b>   |
|  |                  |                       |               |                      |                       |                        |                        |               | Spot check conformance to PPM requirements.  |
| y  | n                | S                     |               | P                    | C                     | F                      | U                      |               | <b>Utility Adjustments</b>   |
|  |                  |                       |               |                      |                       |                        |                        |               | Spot check conformance to PPM requirements.  |
| y  | n                | S                     |               | P                    | C                     | F                      | U                      |               | <b>Selective Clearing and Grubbing</b>   |
|  |                  |                       |               |                      |                       |                        |                        |               | Spot check conformance to PPM requirements.  |
| y  | n                | S                     |               | P                    | C                     | F                      | U                      |               | <b>Mitigation Plans (review by Permit Coordinator)</b>   |
|  |                  |                       |               |                      |                       |                        |                        |               | Spot check conformance to PPM requirements.  |
| y  | n                | S                     |               | P                    | C                     | F                      | U                      |               | <b>Miscellaneous Structure Plans (review by Structures &amp; component discipline)</b>   |
|  |                  |                       |               |                      |                       |                        |                        |               | Spot check conformance to PPM requirements.  |
| y  | n                | S                     |               | P                    | C                     | F                      | U                      |               | <b>Signing and Pavement Marking Plans (when in rdwy plans)</b>   |
|  |                  |                       |               |                      |                       |                        |                        |               | Spot check conformance to PPM requirements.  |
| y  | n                | S                     |               | P                    | C                     | F                      | U                      |               | <b>Signalization Plans (when in rdwy plans)</b>  |
|  |                  |                       |               |                      |                       |                        |                        |               | Spot check conformance to PPM requirements.  |
| y  | n                | S                     |               | P                    | C                     | F                      | U                      |               | <b>Intelligent Transportation System (ITS) Plans (when in rdwy plans)</b>  |
|  |                  |                       |               |                      |                       |                        |                        |               | Spot check conformance to PPM requirements.  |
| y  | n                | S                     |               | P                    | C                     | F                      | U                      |               | <b>Lighting Plans (when in rdwy plans)</b>   |

| EOB QC/QA review   | FDOT QADS Review | Support Documentation | NTP + 20 DAYS | Phase I (30%) review | Phase II (60%) review | Phase III (90%) review | Phase IV (100%) review | Update review |   |
|--|------------------|-----------------------|---------------|----------------------|-----------------------|------------------------|------------------------|---------------|---|
| <b>LEGEND:</b>   |                  |                       |               |                      |                       |                        |                        |               |   |
| y = yes, n = no, S = support documentation to assist the review,   |                  |                       |               |                      |                       |                        |                        |               |   |
| Status Key from January 2006 PPM, Vol II, Fig 2.1(revised January 1, 2008):<br>P = Preliminary; C = Complete but subject to change; F = Final; U = Updated |                  |                       |               |                      |                       |                        |                        |               |   |
| <b>COMPONENT TYPE/SHEET TYPE/REVIEW ELEMENT</b>  |                  |                       |               |                      |                       |                        |                        |               |   |
|  |                  |                       |               |                      |                       |                        |                        |               | Spot check conformance to PPM requirements.                             |
| y  | n                | S                     |               | P                    | P                     | C                      | F                      | U             | <b>Landscape Plans (when in rdwy plans)</b>                             |
|  |                  |                       |               |                      |                       |                        |                        |               | Spot check conformance to PPM requirements.                             |
| y  | n                | S                     |               |                      |                       | C                      | F                      | U             | <b>Utility Joint Participation Agreement Plans (when in rdwy plans)</b> |
|  |                  |                       |               |                      |                       |                        |                        |               | Spot check conformance to PPM requirements.                             |
| y  | n                | S                     |               |                      |                       | C                      | F                      | U             | <b>Roadway Joint Participation Agreement Plans (when in rdwy plans)</b> |
|  |                  |                       |               |                      |                       |                        |                        |               | Spot check conformance to PPM requirements.                             |
| y  | n                | S                     |               |                      | P                     | C                      | F                      | U             | <b>Signing &amp; Pavement Marking Plans Component:</b>                  |
| y  | n                | S                     |               |                      | P                     | C                      | F                      | U             | <b>Signalization Plans Component:</b>                                   |
| y  | n                | S                     |               |                      | P                     | C                      | F                      | U             | <b>Intelligent Transportation System (ITS) Plans Component:</b>         |
| y  | n                | S                     |               |                      | P                     | C                      | F                      | U             | <b>Lighting Plans Component:</b>  |
| y  | n                | S                     |               |                      | P                     | C                      | F                      | U             | <b>Landscape Plans Component:</b>                                       |
| y  | n                | S                     |               |                      | P                     | C                      | F                      | U             | <b>Architectural Plans Component:</b>                                   |
| y  | n                | S                     |               |                      | P                     | C                      | F                      | U             | <b>Structures Plans Component:</b>                                      |
| y  | n                | S                     |               |                      |                       | C                      | F                      | U             | <b>Roadway Joint Participation Agreement GOES WITH Plans</b>            |
| y  | n                | S                     |               |                      |                       | C                      | F                      | U             | <b>Utility Joint Participation Agreement GOES WITH Plans</b>            |
| y  | n                |                       |               |                      |                       |                        |                        |               | <b>Maintenance Maps</b>   |
| y  | n                |                       |               |                      |                       |                        |                        |               | <b>Control Maps</b>   |
| y  | n                |                       |               |                      |                       |                        |                        |               | <b>Right-of Way Maps</b>  |

### 3.3. TRAFFIC CONTROL PLAN

In order to perform timely traffic control reviews of projects prepared by both Consultant and Department, the phase submittal packages should be complete. The package should include supplemental support documents to assist and expedite the Quality Assurance review. The review will be for the purpose of verifying the Engineer of Record has performed the project's Quality Control review and implemented or responded to the QC reviewers' comments. The Department's Quality Assurance Design Services staff will perform varying degrees of review on different elements of the submittal. The phase dependent reviews may consist of only verifying the element is included, or spot checking, or detailed review of a portion of the element.

#### Critical Monitoring Plan

- Verify Project Manager/Engineer of Record received Traffic Control Plan (TCP) expectations.
- Verify Project Manager/Engineer of Record received District Standard project specific notes.
- Review lane closure analysis.
- Assess General Notes for conformance/contradictions with specifications, standards, policy and practice.
- Review Phase Notes for practicality and completeness.
- Verify that lane widths and drop-off criteria are met.
- Assure that Traffic Control plan sheets agree with the General Notes and Phase Notes.
- Review structures, signals, lighting, signing foundations and drainage for constructability and inclusion in the T.C.P..
- Verify need for temporary drainage has been addressed satisfactorily.
- Check that major intersections have been accommodated.
- Constructability of plans, with a safe, workable traffic control plan

The following table lists the expected review items for the phase submittal and some of the elements to be reviewed. Under the column "Support Documentation" the "S" is an expected item to assist in the review. Generally, it will not be reviewed and commented on. The majority of the elements listed are those that have been repeatedly commented on in previous reviews. Some will be verify project has been modified to reflect "Update" memos or revised manuals, policies, etc.

**Note:** See following table.

| EOR QC/QA review   | FDOT QADS Review | Support Documentation | NTP + 20 DAYS | Phase I (30%) review | Phase II (60%) review | Phase III (90%) review | Phase IV (100%) review | Update review |  |   |
|--|------------------|-----------------------|---------------|----------------------|-----------------------|------------------------|------------------------|---------------|--|---|
| <b>LEGEND:</b>   |                  |                       |               |                      |                       |                        |                        |               |  |   |
| y = yes, n = no, S = support documentation to assist the review,   |                  |                       |               |                      |                       |                        |                        |               |  |   |
| Status Key from January 2006 PPM, Vol II, Fig 2.1(revised January 1, 2008):<br>P = Preliminary; C = Complete but subject to change; F = Final; U = Updated |                  |                       |               |                      |                       |                        |                        |               |  |   |
| <b>COMPONENT TYPE/SHEET TYPE/REVIEW ELEMENT</b>  |                  |                       |               |                      |                       |                        |                        |               |  |   |
| <b>TRAFFIC CONTROL PLANS QA REVIEW</b>   |                  |                       |               |                      |                       |                        |                        |               |  |   |
| y  | n                | y                     | y             | y                    | y                     | y                      | y                      | y             |  | Transmittal Letter with list of deliverables  |
| y  | y                | y                     | y             |                      |                       |                        |                        |               |  | Project Specific Quality Control Plan   |
| y  | y                | y                     |               | y                    | y                     | y                      | y                      | y             |  | Contract Plans (all required components for phase submittal)  |
| y  | y                | y                     |               |                      | y                     | y                      | y                      | y             |  | Marked up plans from prior review submittal and the comments with EOR's responses (all disciplines) with Resolution Letter  |
| y  | y                | S                     | y             | y                    | y                     | y                      | y                      | y             |  | Major changes since previous submittal (as an attachment to transmittal letter or sheet 1A "Notes to Reviewers")  |
| <b>Roadway Component:</b>  |                  |                       |               |                      |                       |                        |                        |               |  |   |
| y  | n                | S                     |               |                      | P                     | C                      | F                      | F             |  | Summary of Pay Items (to be reviewed by Estimates)  |
| y  | y                |                       |               |                      |                       |                        |                        |               |  | Cursory review to verify project MOT pay items are included   |
| y  | y                |                       |               | P                    | P                     | C                      | F                      | F             |  | Plan/Profiles   |
| y  | y                |                       |               |                      |                       |                        |                        |               |  | Verify Begin and End Construction stations, include limits of temporary pavement used for maintenance of traffic that may fall outside of the actual project limits. (Advance warning construction signs are not a factor in determining construction limits.)  |
| y  | y                |                       |               | P                    | P                     | C                      | F                      | F             |  | Intersection Layout/Details   |
| y  | y                |                       |               |                      | y                     | y                      |                        | y             |  | Check main line and stub pipe runs for unnecessary depth. Deep pipe installations are expensive and time consuming to construct, require wider trenches or specialized excavation procedures and equipment, and are more disruptive for traffic control and utility work. Any speed reduction needs to be approved.   |
| y  | y                |                       |               |                      | y                     | y                      |                        | y             |  | Spot Check there is adequate room to construct pipes and structures located close to the R/W line.  |
| y  | y                |                       |               |                      | y                     | y                      |                        | y             |  | Spot check impact that drainage structure and pipe construction will have on maintenance of traffic and utilities.  |
| y  | y                |                       |               | P                    | P                     | C                      | F                      | F             |  | Cross Sections  |
| y  | y                |                       |               |                      | y                     | y                      | y                      | y             |  | Spot Check cross sections to determine if limits of construction causes proposed TCP to be outside of R/W or easement limits.   |
| y  | y                |                       |               |                      | y                     | y                      | y                      | y             |  | Spot check cross sections for soil strata requiring special consideration and treatment (should be identified and limits clearly defined), and reviewed for impact to TCP.  |
| y  | n                | S                     |               |                      | P                     | C                      | F                      | F             |  | Stormwater Pollution Prevention Plan (review by Permit Coordinator)   |
| y  | y                |                       |               |                      | y                     | y                      |                        | y             |  | Spot check conformance to PPM requirements.   |
| y  | y                |                       |               | P                    | P                     | C                      | F                      | F             |  | Traffic Control Plans   |
| y  | y                |                       |               |                      | y                     | y                      | y                      | y             |  | Verify any reduction of the regulatory speed limits in the work zones have been approved by The District Traffic Operations Engineer (note: the only basis for reducing the regulatory speed limit is to meet the requirements necessary for geometric restrictions or horizontal clearance). Otherwise, the posted speed should be maintained in work zones. |
| y  | y                |                       |               |                      | y                     | y                      | y                      | y             |  | Traffic Control Plans reviewed for areas that may trap water and not drain adequately. Verify temporary drainage system and/or structures are provided. Or if utilizing existing or proposed systems with temporary structures. Actual cross sections need to show how problem areas are rectified.   |
| y  | y                |                       |               |                      | y                     | y                      | y                      | y             |  | Verify Temporary RPMs, item 102-78, are included when traffic is required to be placed on lifts of structural asphalt.  |
| y  | y                |                       |               |                      | y                     | y                      | y                      | y             |  | The design documentation should include the MOT concept.  |
| y  | y                |                       |               |                      | y                     | y                      | y                      | y             |  | The design documentation should include statement regarding the project's TCP level of complexity   |

| EOB QC/QA review  | FDOT QADS Review | Support Documentation | NTP + 20 DAYS | Phase I (30%) review | Phase II (60%) review | Phase III (90%) review | Phase IV (100%) review | Update review |   |
|---|------------------|-----------------------|---------------|----------------------|-----------------------|------------------------|------------------------|---------------|---|
| <b>LEGEND:</b>  |                  |                       |               |                      |                       |                        |                        |               |   |
| y = yes, n = no, S = support documentation to assist the review,            |                  |                       |               |                      |                       |                        |                        |               |   |
| Status Key from January 2006 PPM, Vol II, Fig 2.1(revised January 1, 2008): |                  |                       |               |                      |                       |                        |                        |               |   |
| P = Preliminary; C = Complete but subject to change; F = Final; U = Updated |                  |                       |               |                      |                       |                        |                        |               |   |
| <b>COMPONENT TYPE/SHEET TYPE/REVIEW ELEMENT</b>                             |                  |                       |               |                      |                       |                        |                        |               |   |
| y   | y                |                       |               | y                    | y                     | y                      |                        | y             | Verify need for Variable Message Signs and review messages shown.   |
|   |                  |                       |               |                      |                       |                        |                        |               | A separate spreadsheet showing temporary items to be included under the maintenance of traffic pay item and the estimated quantities should be supplied to District 5 Estimates so they can prepare a cost estimate for this work. (Do not tabulate these items and quantities on the Traffic Control plans.) If the Special Detour pay item is required, then a tabulation of required items and quantities should be prepared and included in the Traffic Control Plan. |
| y   | y                |                       |               | y                    | y                     | y                      |                        | y             | Verify the TCP addresses the information shown in section 10.4 of PPM volume 1  |
| y   | y                |                       |               | y                    | y                     | y                      |                        | y             | Verify the TCP addresses adjoining, intersecting or sequential work zones.  |
| y   | y                |                       |               |                      |                       |                        |                        | y             | Verify the TCP of "on the shelf" project has been updated.  |
| y   | y                |                       |               | y                    | y                     |                        |                        | y             | Confirm construction and traffic operations has received plans to review.   |
| y   | y                |                       |               | y                    |                       | y                      |                        | y             | Review of TCP typical section(s) for each phase, description of the phasing sequence and work involved.   |
| y   | y                |                       |               |                      | y                     | y                      |                        | y             | Review the TCP for the information shown in section 10.4 of PPM volume 1, notes and phasing sequence.   |
| y   | y                |                       |               | y                    | y                     | y                      |                        | y             | Verify the Design Documentation includes lane closure analysis.   |
| y   | y                |                       |               | y                    | y                     | y                      |                        | y             | Verify each phase has clearly identified in the descriptions the posted speed limit.  |
| y   | y                |                       |               | y                    | y                     | y                      |                        | y             | Verify plans include the appropriate safety appurtenances for work zones shown in sections 10.13 of PPM, volume 1.  |
| y   | y                |                       |               | y                    | y                     | y                      |                        | y             | Verify plans include the appropriate plan details shown in sections 10.14 of PPM, volume 1.   |
| y   | y                |                       |               | y                    | y                     | y                      |                        | y             | Verify the TCP General Notes includes reference to Design Standards Index 600 series.   |
| y   | y                |                       |               | y                    | y                     | y                      |                        | y             | Verify the TCP General Notes contains statement regarding lane closures; either "there are no lane closure restrictions" or "no lane closures permitted between _____ and _____" and "lane closure only during active work periods".  |
| y   | y                |                       |               | y                    | y                     | y                      |                        | y             | Review TCP for required information listed in section 19.2 of the PPM , volume II.  |
| y   | n                | S                     |               |                      | P                     | C                      | F                      | F             | <b>Utility Adjustments</b>  |
| y   | n                | S                     |               |                      | P                     | C                      | F                      | F             | <b>Selective Clearing and Grubbing</b>  |
| y   | n                | S                     |               |                      | P                     | C                      | F                      | F             | <b>Signing/Pavement Marking Plans (when in rdwy plans)</b>  |
| y   | n                | S                     |               |                      | P                     | C                      | F                      | F             | <b>Signalization Plans (when in rdwy plans)</b>   |
| y   | n                | S                     |               |                      | P                     | C                      | F                      | F             | <b>Lighting Plans (when in rdwy plans)</b>  |
| y   | n                | S                     |               | P                    | P                     | C                      | F                      | F             | <b>Landscape Plans (when in rdwy plans)</b>   |
| y   | n                | S                     |               |                      | P                     | C                      | F                      | F             | <b>Mitigation Plans</b>   |
| y   | n                | S                     |               |                      | P                     | C                      | F                      | F             | <b>Miscellaneous Structure Plans</b>  |
| y   | n                | S                     |               |                      | P                     | C                      | F                      | F             | <b>Signing &amp; Pavement Marking Component:</b>  |
| y   | n                |                       |               |                      |                       |                        |                        |               | Key Sheet   |
| y   | n                |                       |               |                      |                       |                        |                        |               | Tabulation of Quantities  |
| y   | n                | S                     |               |                      | y                     | y                      |                        | y             | Plan Sheets   |
| y   | n                |                       |               |                      |                       |                        |                        |               | Guide Sign worksheet (if required)  |
| y   | n                | S                     |               |                      | y                     | y                      |                        | y             | Overhead Sign Cross Section Sheet (if required)   |
| y   | n                | S                     |               |                      | y                     | y                      |                        | y             | Overhead Sign Support Design (if required)  |
| y   | n                | S                     |               |                      | y                     | y                      |                        | y             | Foundation Details (if required)  |
| y   | n                |                       |               |                      |                       |                        |                        |               | Boring Data Sheets (if required)  |
| y   | n                | S                     |               |                      | P                     | C                      | F                      | F             | <b>Signalization Component:</b>   |
| y   | n                |                       |               |                      |                       |                        |                        |               | Key Sheet   |

| EOB QC/QA review  | FDOT QADS Review | Support Documentation | NTP + 20 DAYS | Phase I (30%) review | Phase II (60%) review | Phase III (90%) review | Phase IV (100%) review | Update review |  |
|---|------------------|-----------------------|---------------|----------------------|-----------------------|------------------------|------------------------|---------------|--|
| <b>LEGEND:</b>  |                  |                       |               |                      |                       |                        |                        |               |  |
| y = yes, n = no, S = support documentation to assist the review,            |                  |                       |               |                      |                       |                        |                        |               |  |
| Status Key from January 2006 PPM, Vol II, Fig 2.1(revised January 1, 2008): |                  |                       |               |                      |                       |                        |                        |               |  |
| P = Preliminary; C = Complete but subject to change; F = Final; U = Updated |                  |                       |               |                      |                       |                        |                        |               |  |
| <b>COMPONENT TYPE/SHEET TYPE/REVIEW ELEMENT</b>                             |                  |                       |               |                      |                       |                        |                        |               |  |
| y   | n                |                       |               |                      |                       |                        |                        |               | Tabulation of Quantities                           |
| y   | n                | S                     |               | y                    | y                     |                        |                        | y             | Plan Sheets  |
| y   | n                | S                     |               | y                    | y                     |                        |                        | y             | Mast Arm Details (if required)                     |
| y   | n                | S                     |               | y                    | y                     |                        |                        | y             | Foundation Details - Mast Arms (if required)       |
| y   | n                |                       |               |                      |                       |                        |                        |               | Boring Data Sheets - Mast Arms (if required)       |
| y   | n                | S                     |               |                      | P                     | C                      | F                      | F             | <b>Lighting Component:</b>                         |
| y   | n                |                       |               |                      |                       |                        |                        |               | Key Sheet  |
| y   | n                |                       |               |                      |                       |                        |                        |               | Tabulation of Quantities                           |
| y   | n                | S                     |               | y                    | y                     |                        |                        | y             | Pole Data and Legend Sheet                         |
| y   | n                | S                     |               | y                    | y                     |                        |                        | y             | Plan Sheets or Layout Sheets                       |
| y   | n                | S                     |               | y                    | y                     |                        |                        | y             | Foundation Details - High Mast (if required)       |
| y   | n                |                       |               |                      |                       |                        |                        |               | Boring Data Sheets - High Mast (if required)       |
| y   | n                | S                     |               |                      | P                     | C                      | F                      | F             | <b>Landscape Component:</b>                        |
| y   | n                |                       |               |                      |                       |                        |                        |               | Key Sheet  |
| y   | n                |                       |               | y                    | y                     |                        |                        | y             | Tabulation of Quantities                           |
| y   | n                | S                     |               | y                    | y                     |                        |                        | y             | Planting Sheets                                    |
| y   | n                | S                     |               | y                    | y                     |                        |                        | y             | Irrigation Layout                                  |
| y   | n                |                       |               |                      |                       |                        |                        |               | Planting Schedule and Details Sheet                |
| y   | n                | S                     |               | y                    | y                     |                        |                        | y             | Other relevant plan sheets per chap.               |
| y   | n                | S                     |               |                      | P                     | C                      | F                      | F             | <b>Architectural Component:</b>                    |
| y   | n                | y                     |               |                      |                       |                        |                        |               | Key Sheet  |
| y   | n                | S                     |               |                      | P                     | C                      | F                      | F             | <b>Structures Component:</b>                       |
| y   | n                | S                     |               |                      | P                     | C                      | F                      | F             | <b>Roadway Joint Participation Agreement Plans</b> |
| y   | n                | S                     |               |                      | P                     | C                      | F                      | F             | <b>Utility Joint Participation Agreement Plans</b> |
| y   | n                | y                     |               |                      |                       |                        |                        |               | <b>Right-of Way Maps</b>                           |

### **3.4. Drainage Design & Permitting**

#### **PURPOSE**

The Drainage Design Quality Assurance Process for Consultant Plans describes the methodology by which the Drainage Department ensures documents submitted by Consultants are verified, independently checked and reviewed by qualified FDOT drainage staff or FDOT drainage consultants.

The goal of the Drainage Design Quality Assurance Process is to provide uniform guidelines for Drainage Department employees to verify the adequacy and quality of drainage related designs and studies, to ensure economy of design, plans clarity, completeness and prepared in accordance with all applicable regulations, standards, policies and procedures.

This plan will be adhered to by the Drainage Design Department, renewed periodically for effectiveness and revised as necessary to maintain the highest standards of quality.

#### **DRAINAGE DESIGN TEAM MEMBER**

A minimum of one representative from the Drainage Office will be assigned to all consultant projects prior to the consultant acquisition process. The representative will be proactive in their role with all stakeholders, partners, and others while actively seeking opportunities to influence events to accomplish the goals and objectives of the Department. This team member will also be responsible to administer the appropriate Quality Assurance reviews for the project.

#### **QUALITY ASSURANCE CRITICAL MONITORING PLAN**

The QA review is a cursory, confirmation review conducted by Department personnel to ensure the consultant has complied with their submitted QA plan and to provide a degree of confidence in the adequacy of the design. The QA review will be conducted at project specific phase submittals and will vary depending upon project specific issues and complexity.

The requirements of a QA review may vary depending on the type of project being evaluated (Major, RRR, Bridge, etc.), therefore a detailed checklist of minimum specific QA review items is being provided below (see Section 5).

The following represents Quality Assurance Critical Monitoring items which summarizes key Quality Assurance review areas of a given project.

- a) Check submittal package for completeness.

- b) Insure that the Consultant performed a proper QC on the plans.
- c) Perform QA checks on profile grade line.
- d) Perform criteria compliance QA checks on calculations.
- e) Perform completeness and content QA checks against criteria on Bridge Hydraulic Reports and BHRS.
- f) Perform compliance QA checks on plan details.
- g) Verify compliance with permit criteria.
- h) Perform QA verification of responses to previous comments.
- i) Perform QA check of final Mylar drainage map and signed/sealed calculations.

### **TYPES OF PLANS AND DOCUMENTS FOR QUALITY ASSURANCE REVIEW**

The Drainage Design Department is involved in performing Quality Assurance review of the following types of design documents:

- A) Urban and Rural Roadway Projects
  - Add Lanes (partial reconstruction)
  - Add Lanes (total reconstruction)
  - RRR
  - Intersection Improvements
  - Safety Improvements
  - Special Drainage Projects (French Drains, etc.)
- B) Bridge and Culvert Projects
  - Widening
  - Replacements
- C) Design Pond Siting Reports
- D) PD&E Documentation
  - Preliminary Pond Siting Report
  - Location Hydraulic Report
- E) Shop Drawing Submittals

### **QUALITY ASSURANCE REVIEW CHECK LISTS (Specific Review Items)**

- A) Urban and Rural Roadway Projects
  - 1) Add Lanes
    - Drainage map: Check as per PPM requirements
    - Check Profile Grade Line
    - Check pipe length from structure to structure (only one) for accuracy.
    - Optional Pipe:

- a) Verify corrosion analysis.
- b) Verify Standard Index compliance.
- Verify Spread Compliance.
- Storm Sewer Tabulations:
  - a) Check Storm Sewer Tabulation Sheet format.
  - b) Check Tail Water used.
- Check adjacent properties grade for drainage impacts and existing connections (field review).
- Check side street drainage (field and plans).
- Verify completeness of flood data box/cross drain analysis.
- Ponds:
  - a) Check plan's criteria compliance and verify contour lines.
  - b) Check calculations for completeness and compliance (critical storm, weir, seasonal high, DHW, etc.).
  - c) Check for off-site water impacts.
  - d) Check soil characteristics.
  - e) Verify outfall easements.
- French Drains:
  - a) Verify soil characteristics.
  - b) Check calculations for completeness and compliance.
  - c) Check location.
- Check for utility conflicts and avoidance.
- Check for appropriate inlet selection (Types)
- Verify MOT drainage plan submittal.
- Verify compliance with permit criteria
- Check drainage structure sheets for completeness and accuracy (1 out of 10).

2) RRR Projects

- Verify that maintenance records were reviewed and addressed.
- Review Maintenance Office documentation or other record regarding flooding problems.
- Verify submittal of Flood Data Sheet.
- Verify that structure cross section drawings are included.
- Check adequacy of existing ditches to be filled.
- Verify erosion control plan.
- Verify compliance of permitting requirements.
- Verify compliance of slope criteria.
- Check existing end treatment on side drains and cross drains.
- Verify drain pipe end separation criteria.
- Verify pipe clearance criteria on side drains and cross drains.
- Check the grate requirements on side drains and cross drains.

B) Bridge and Culvert Projects

- 1) Widening
  - Check scour, hydraulic and hydrology calculations.
  - Compare existing pile lengths with scour analysis and verify counter measures.
  - Verify deck drainage.
  - Verify completeness of BHRS.
  - Verify that maintenance records were reviewed and addressed.
  - Verify that appropriate abutment protection is provided.
  - Verify road drainage to canal/stream/river crossing.
  - Verify roadway typical section/profile for drainage
  
- 2) Replacement
  - Check scour, hydraulic and hydrology calculations.
  - Verify deck drainage.
  - Verify appropriate bridge length.
  - Verify completeness of BHRS.
  - Check BHR format against Drainage Manual.
  - Verify temporary drainage submittal.
  - Check temporary detour bridge for scour compliance.
  - Verify that maintenance records were reviewed addressed.
  - Verify that appropriate abutment protection is provided.
  - Verify road drainage to canal/stream/river crossing.
  - Verify roadway typical section/profile for drainage.
  
- 3) Bridge Culverts
  - Check temporary drainage.
  - Verify culvert drainage design criteria compliance.
  - Verify completeness of flood data sheet.
  - Verify scour analysis was performed.
  
- C) Design and PD&E Pond Siting Reports
  - Verify the report was prepared in accordance with the FDOT Pond Siting Handbook.
  - Check pond outfalls are included in matrix.
  - Verify discussions with the landowner.
  
- D) PD&E Documentation: Location Hydraulics Report (LHR)
  - Check the report for compliance with FDOT PD & E Manual, Chapter. 24, ("Floodplains").
  - Check if the questions in Section 24.2.2.1 of the FDOT PD&E Manual pertaining to encroachments were written and responded to in the report.
  
- E) Shop Drawing Submittals
  - Verify contractor has stamped the shop drawings.
  - Verify EOR has stamped shop drawings appropriately.

- QC a minimum of 4 random structures or 5% of total.

### **3.5. Structures Design**

#### **A) Purpose**

A critical requirement is one that could prevent or reveal significant problems or produce significant benefits to the Department and the public. Critical requirements are indicators of the Department's level of adherence to proper processes, standards and engineering practices.

#### **B) Critical Requirements**

The critical requirements are divided into three (3) primary areas that shall be monitored for structures design projects. These areas are classified as:

1. **Pre-Design:** This area encompasses the activities that occur prior to the design and development of the contract documents. The primary activities of the pre-design phase are the Preliminary Engineering and Consultant Acquisition phases.
2. **Design:** This area encompasses the activities required for the development and production of the contract documents. The primary activities of the design phase are Consultant Plans Review, Design Build Plans Review and Permit Plans Review (includes LAP projects and JPA projects).
3. **Post-Design:** This area encompasses activities required for the support of the construction of the design project. The primary activities for the post-design phase are Technical Assistance in support of construction activities and Shop Drawing Review

#### **C) Critical Requirement Details**

Specific issues further detail the critical monitoring activities. Active participation by the Structures Design Office staff is essential for the successful completion of each activity.

1. **Pre-Design:**
  - a. **Preliminary Engineering Activities**
    - Assist in scope development
    - Prepare staff-hour estimate
    - Negotiate staff-hours
    - Review proposals, documents, concepts, etc.
    - Participate in meetings
  - b. **Consultant Acquisition Activities**
    - Prepare preliminary design & construction estimates
    - Assist in scope development
    - Assist in schedule development
    - Assist in consultant selection
    - Review technical proposals

- 
- Prepare staff-hour estimate
  - Negotiate staff-hours
  - Participate in meetings (Scope Negotiations, Kick-off, Team Meetings, etc.)
- c. Project Schedule
- Assist in schedule development
2. Design:
- a. **Bridge Development Report (Structure Type Selection)**
- BDR checklist provided
  - Geometric parameters identified
  - Alignment approved
  - Typical section approved
  - Bridge location, length, skew and other optimized
  - Design parameters identified
  - Geotechnical data provided
  - Hydraulics issues addressed
  - Scour needs addressed
  - Ship Impact addressed
  - Viable superstructure options considered
  - Viable substructure options considered
  - Structure layout optimized
  - Retaining wall options considered
  - Constructability addressed
  - Maintainability addressed
  - Cost estimates reflect actual conditions
  - Conclusions are reasonable and supported
  - New construction methods & specifications are identified
- b. 30% Plans (Geometrics, Preliminary Structural Sizes and Shapes)
- Design 60% complete
  - Submittal requirements provided
  - Results of BDR or preliminary studies incorporated
  - Geotechnical information incorporated
  - Hydraulic information incorporated
  - Scour needs incorporated
  - Ship Impact incorporated
- c. 60% Substructure Plans (Geotechnical & Hydraulic)
- Design 75% complete
  - Submittal requirements provided
  - Review comments incorporated as appropriate
  - Results of BDR or preliminary studies incorporated

- Geotechnical information incorporated
  - Final foundation design complete
  - Hydraulic information incorporated
  - Scour needs incorporated
  - Ship Impact incorporated
  - MOT review complete
- d. 90% Plans (Structural Details & Bidability)
- Design complete
  - Submittal requirements provided
  - Review comments resolved & incorporated as appropriate
  - Geotechnical information incorporated
  - Scour needs incorporated
  - Ship Impact incorporated
  - Constructability review complete
  - Draft Technical Special Provisions provided
  - CES complete
  - Computation books complete
- e. Specification Submittal
- All review comments resolved
  - Specifications complete
  - Technical Special Provisions complete
3. Post Design:
- a. Shop Drawings
- Attend pre-construction meeting (in-house projects only)
  - Maintain shop drawing log book
  - Review and processing of shop drawings
  - Resolve shop drawing related issues
- b. Construction Assistance
- Attend partnering meetings
  - Attend field meetings
  - Participate in the resolution of issues
  - Review Value Engineering Change Proposals

### **3.6. TRAFFIC PLANS & STANDARDS**

See Chapter 4 or go to: <http://d5web.d5.state.fl.us/operations/05/index.htm>

Traffic Operation Guidelines to see their direction for QA review.

In District 5, the Traffic Plans & Standard portion of our projects are handled by Traffic Operations.

### 3.7. MATERIALS & RESEARCH

- Check to see if the QC Checklist has been completed by the consultant.
- Spot check several individual items on the QC Checklist to assure quality level.
- Spot check ESHW vs. base elevation.
- Spot check Pile Data Table/Quantities
- Spot check the Soil Survey Sheet
- Spot check for potential excavation issues (areas where boulders are suspected, difficult excavation, etc.).
- Check for unusual items.

| <b>MATERIALS AND RESEARCH<br/>Critical Monitoring Plan Checklist<br/>(to be filled out by the Consultant's QC Representative)</b> | <b>YES</b> | <b>NO</b> | <b>N/A</b> |
|---|------------|-----------|------------|
| <b>Roadway and WRA:</b>   |            |           |            |
| Contract Estimating System (CES)  |            |           |            |
| Concrete Box Culvert Data Sheets  |            |           |            |
| Drainage Maps   |            |           |            |
| Typical Section(s)  |            |           |            |
| Summary of Quantities Sheet   |            |           |            |
| Summary of Drainage Structures  |            |           |            |
| Plan and Profile Sheets   |            |           |            |
| Roadway Soil Survey Sheet   |            |           |            |
| Cross Sections  |            |           |            |
| Traffic Control Plan Notes  |            |           |            |
| Boring Coverage   |            |           |            |
| Seasonal High GW  |            |           |            |
| Non-select Materials  |            |           |            |
| Non-select Materials Quantities   |            |           |            |
| Difficult Excavation  |            |           |            |
| Artesian Water  |            |           |            |
| Exfiltration Systems in Sinkhole Sensitive Areas  |            |           |            |
| Subgrade/Base Compaction  |            |           |            |
| Extensive Dewatering  |            |           |            |
| Ditch, Canal & Pond Slopes  |            |           |            |
| Sinkhole Prone Roadways & WRA   |            |           |            |
| Excavations   |            |           |            |
| WRA Plan View   |            |           |            |
| Surcharge   |            |           |            |

| <b>MATERIALS AND RESEARCH<br/>Critical Monitoring Plan Checklist<br/>(to be filled out by the Consultant's QC Representative)</b> | <b>YES</b> | <b>NO</b> | <b>N/A</b> |
|---|------------|-----------|------------|
| Removal of Existing Piles   |            |           |            |
| <b>Drilled Shaft Foundations:</b>   |            |           |            |
| Underground/Overhead Utilities  |            |           |            |
| Obstructions  |            |           |            |
| Obstruction Quantities  |            |           |            |
| Noise   |            |           |            |
| Vibration   |            |           |            |
| Turbidity   |            |           |            |
| Hole Stability (Non-Miscellaneous Structures)   |            |           |            |
| Artesian Water  |            |           |            |
| Drilled Shaft Installation Table  |            |           |            |
| SPT Cores   |            |           |            |
| Plan and Elevation Sheet  |            |           |            |
| Environmental Classification  |            |           |            |
| Rock Cores  |            |           |            |
| Inspection Device (ID)  |            |           |            |
| Reinforced Test Hole  |            |           |            |
| Difficult Excavation/Casing Installation  |            |           |            |
| Pay Items/Quantities  |            |           |            |
| Boring Profiles   |            |           |            |
| Miscellaneous Drilled Shafts  |            |           |            |
| Long Range Estimates (LRE)  |            |           |            |
| <b>CONSTRUCTION MATERIALS QC CHECKLIST</b>  |            |           |            |
| Class of Concrete vs. Strength Specified in the Plans   |            |           |            |
| Paint Items: Specified Paints and Painting Procedures are to Spec.  |            |           |            |
| Concrete specified for the Environmental Classification is Appropriate  |            |           |            |

### 3.8. MAINTENANCE

FPN: \_\_\_\_\_

State Road No.: \_\_\_\_\_

\_\_\_\_\_ Are all structures accessible for maintenance?

\_\_\_\_\_ Is maintenance information needed regarding unique or unusual structures (e.g., special maintenance requirements, frequency of anticipated maintenance, reason specifying the unique structure, historical performance of this type of structure, etc.)?

\_\_\_\_\_ Do the plans include structures which have historically required excessive maintenance (e.g., rapid sand filters, french drains, etc.)?

\_\_\_\_\_ Do any walls appear to be difficult to maintain? If so, what alternatives has the designer considered?

\_\_\_\_\_ Are slopes maintainable and accessible for maintenance?

\_\_\_\_\_ Are easements sufficient for maintenance access to outfalls, ditches and other features?

\_\_\_\_\_ Are adequate maintenance berms provided around ponds?

\_\_\_\_\_ Will traffic separators less than or equal to eight feet be constructed with concrete?

\_\_\_\_\_ Do any areas with drainage issues need to be addressed further?

\_\_\_\_\_ Are mowing quantities are included in the plans?

\_\_\_\_\_ Are there unique right-of-way issues (roadway realignments where the department will be responsible for maintenance of old roadways, drainage structures, etc.)?

2. If prestressed slabs – is concrete overlay specified? How thick? Is it poured after post-tensioning?
3. Is deck continuous over piers/bents? If so, is additional reinforcing specified in deck top over bents/piers.
4. Is there any drainage system provided on the bridge deck. Check for maintainability.
5. If widening, profile should match existing or details should be provided to account for change.

**SUBSTRUCTURE**

1. Rip-Rap – details appropriate? Match existing? Vertical face?
2. If widening, substructure should be compatible with existing?

**ATTACHMENTS/APPURTENCES**

1. Fender system –120 volt system specified? No solar powered systems. System should be separated from lighting or other electrical systems.
2. Clearance gage specified?

### **3.10. UTILITIES DESIGN**

#### **Contact**

- Review appropriateness and timeliness of contact letters supplied by the Utility Coordinator.

#### **Agreements**

- Insure the utility executes the same document as supplied by the Utility Coordinator.
- Insure all blank spaces contain the appropriate information.
- Insure the appropriate box is checked concerning the appendix.
- Insure District Legal has reviewed the appendix (if any).

#### **Utility Work Schedule**

- Review Utility Coordinators Q/C comments and responses to their UWS reviews.
- Review Blocks A, B and C to insure the information is correct with sufficient information for others to use before approval.

#### **Consultant Packages**

- Prior to forwarding Statutory Notices, review the packages to insure the information is correct and meets Department Procedures.

#### **Plans**

- Review Utility Coordinators Q/C comments and responses to plan reviews and utility postings.
- Provide the consultant with a plan notes package for use at team meetings or during the kickoff meeting on minor projects. Check plans to insure the proper notes are used.
- Review the listing of Utility Companies, phone numbers along with the use of the no involvement note, if applicable.

#### **SUE Work**

- Offer suggestions concerning the need to verify vertically and horizontally (vvh) utility locations.

### **3.11. SPECIFICATIONS**

#### **PURPOSE**

The Quality Management Plan (QMP) for Specifications describes the methodology and procedures by which document verification is performed, independently checked and reviewed. This Plan will document the checking, review process and produce a verifiable record to show that the Plan was adhered to during the project. The Plan enhances plan quality by:

- Providing uniformity and consistency in the development of plan packages.
- Provide consistence quality in CADD files.
- Provide consistence in Technical Special Provisions.
- Minimize revisions to plans and supplemental specifications.
- Minimize conflicts between specifications and plan notes.

The plan will be followed, reviewed periodically for effectiveness and revised (as necessary) to maintain the highest standards of quality.

#### **QUALITY MANAGEMENT PLAN**

The Quality Management Plan is a process that ensures the QC plan is adhered to during project development and provides a verifiable record of that process.

#### **Quality Management Plan Administration**

The Quality Management Plan is to be administered by the Specifications Office and they are to assure that the Plan is followed. The responsibilities are:

- Assure adherence to the QC Plan.
- Perform QA reviews as required/needed.
- Inform and train new personnel of the QC/QA Plan.
- Review and revise QC/QA Plan as necessary.

#### **Quality Assurance Reviews**

The Specifications Office will perform quality assurance reviews at the following phase of plan package development:

- 90% Submittals

Preparation Manual and related procedures are necessary to produce the final package for letting. The Team shall consist of the following members:

- Engineer-of-Record (EOR)
- Quality Control Reviewer
- Preparer/reviewer of CADD Files
- Preparer of Specifications Package

The seal of a professional engineer imparts a desirable degree of confidence in the specification package and Technical Special provisions. However, it should not be accepted as sole proof that no significant errors, omissions or conflicts exist.

#### Team Member Responsibilities

All team members will be proactive in their role with all stakeholders and partners. The Engineer-of-Record (EOR) shall be a Registered Professional Engineer, in the State of Florida, with appropriate experience for the project requirements and is responsible for:

- Complete development of the plans package to insure specifications, supplemental specifications, developmental specifications, special provisions, and technical special provisions do not conflict with plan notes.
- Plan notes are not duplicated within the plans (including component sets).
- Plan notes do not restate, change or modify specifications, supplemental specifications or special provisions.
- Determining if a specification, supplemental specification or special provision must be modified for a particular project do to conflicting situations on the project.
- Responsible to have special provisions and technical special provisions prepared and approved before using.
- Signing and sealing the final specification package and all Technical Special Provisions.
- Request additional resources.
- Request an independent peer review.
- Provide CADD files meeting criteria and acceptable for electronic letting.
- Provide clear direction to designers and other team members.

#### Contract Plans

The EOR shall insure that:

- Plan notes do not conflict, alter or change the meaning of any specification, supplemental specification, developmental specifications, special provisions, and technical special provisions.
- Plan notes do not restate or duplicate any specification, supplemental specification, developmental specifications, special provisions, and technical special provisions.
- Plan notes are not duplicated on different sheets or component sets.

### Specifications

The EOR shall insure:

- Appropriate specifications, supplemental specification, developmental specifications, special provisions, and technical special provisions are included in the project.
- All necessary Technical Special Provisions are included in the project.
- The specification package properly authenticates in PEDDS.
- The specification package is correct prior to electronically transferring to the District Specifications Office.
- No specification, supplement specification or special provision was altered without proper prior approval for the specific project.

### **Electronic Deliverables**

The EOR shall:

- Forward, with the CD, a copy of the Department's CADD QC/QA Report each time the CD is submitted.
- Forward, with the CD, a copy of the Department's CADD Exception Report each time the CD is submitted.
- Insure that the CD is properly secured and all paper work is submitted each time the CD is submitted.
- Insure the CD properly authenticates in PEDDS.

### CRITICAL MONITORING PLAN

A critical requirement is one that could prevent or reveal significant problems and is an indicator of the Department's level of adherence to proper processes, standards and engineering practices. The following critical activities are to be monitored for the development of plan notes, specification packages, Technical Special Provisions, supplemental specifications, CADD files and other required information:

#### Design Activities

- 90% Plans submittal
- Specification submittal
- S&S plans package submittal

#### Post-Design Activities

- Approve all Change Memos.
- Review all Mandatory Specification changes.
- Prepare Supplemental Specification package.

### Critical Monitoring Plan Elements

Specific issues further detail the critical monitoring activities. Active participation by the QA/QC Team and the Specifications Office staff is essential for the successful completion of each activity.

#### 90% PLANS

- Compatibility of notes with specification, supplemental specification, developmental specifications, special provisions, and technical special provisions.
- PPM requirements met
- Need for and review of the draft Technical Special Provisions.
- Review requests for and the Special Provision
- CD compliance with CADD criteria
  - CDs secured
  - Electronic Data Submittal Checklist was followed.
  - Index of files
  - Appropriate paperwork accompanies CD.

#### SPECIFICATION SUBMITTAL

- Review package completeness (copy of Project Manager's Checklist attached).
- Review Contract File.
- Review comment resolutions.
- Review compatibility of notes and specifications.
- Review Workbook and draft (PDF) specification package.
- Verify required Mandatory changes have been made.
- Verify Design Standards and Specification year.
- Insure Technical Special Provisions completeness.
- Forward Technical Special Provisions for Legal review.
- Obtain Developmental Specifications if requested.
- Review Change Memo and respective sheets.
- Coordinate with Estimates.
- CD compliance with CADD criteria
  - Corrections made.
  - CD's secured.
  - Electronic Data Submittal Checklist was followed.
  - Index of files.
  - Appropriate paperwork accompanies CD.

#### SIGNED AND SEALED PLANS

- Review package completeness (copy of Project Manager's Checklist attached).
- Review final (PDF) specification package.
- Review for final PPM compliance.
- Review comment resolutions.
- Review Specifications QC/QA checklist to insure it was followed (copy attached).
- Review Change Memo and respective plan sheets.

- Check with Estimates for mail verification.
- CD compliance with CADD criteria.
  - Corrections made.
  - CD's in PEDDS and authenticates.
  - Certified Electronic Data Submittal Checklist was followed (signed and dated by EOR).
  - Manifest Document signed, dated and initialed (by EOR).
  - Project Authentication Test document signed by CD preparer and initialed by EOR.
  - Signature document signed and sealed (by EOR).
  - Index of files correct and complete.
  - Appropriate paperwork accompanies CD.

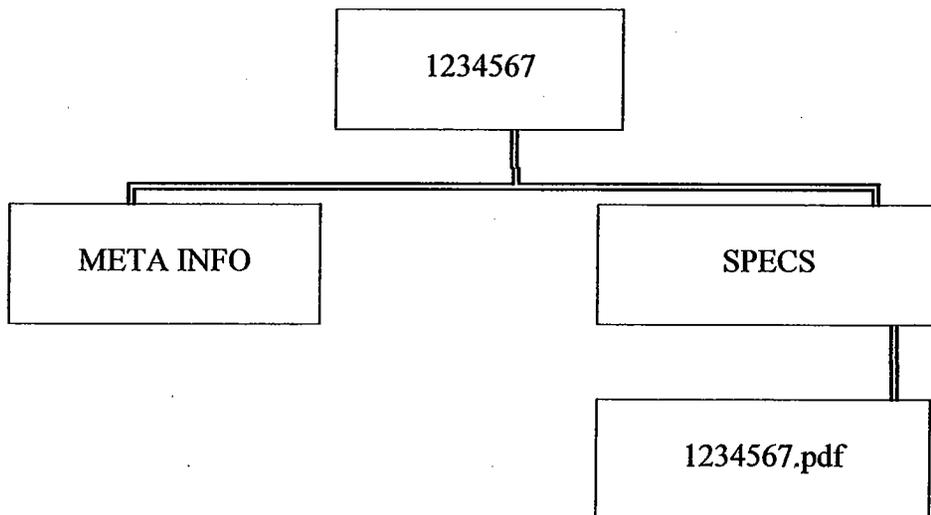
**POST-DESIGN ACTIVITIES**

**REVISIONS AND SUPPLEMENTS SPECIFICATIONS**

- Review Revision Memo, plan sheets and respective elements.
- Review Supplemental specification changes.
- Review Mandatory specification changes.
- Prepare Mandatory Supplemental specification.
- Prepare Supplemental specifications for issues with no plan changes.

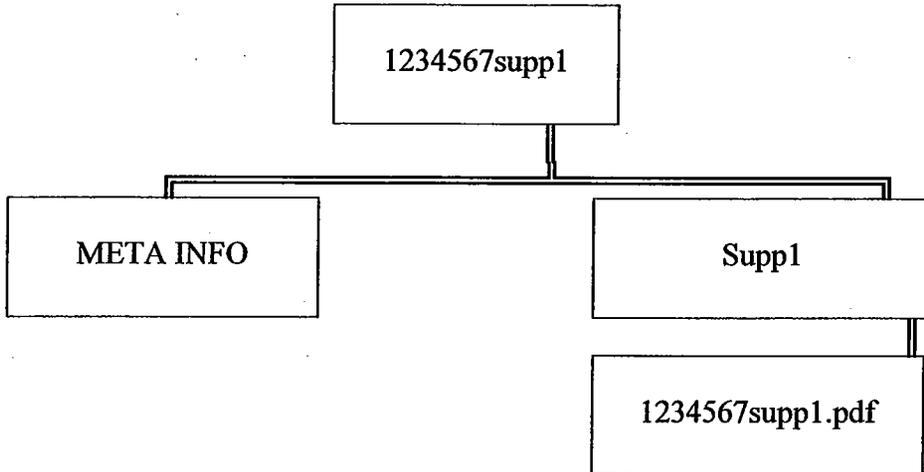
**ELECTRONIC SPECIFICATION PACKAGE DIRECTORY STRUCTURE:**

**PLEASE NOTE: THERE ARE NO DASHES IN THE FPID NUMBER**



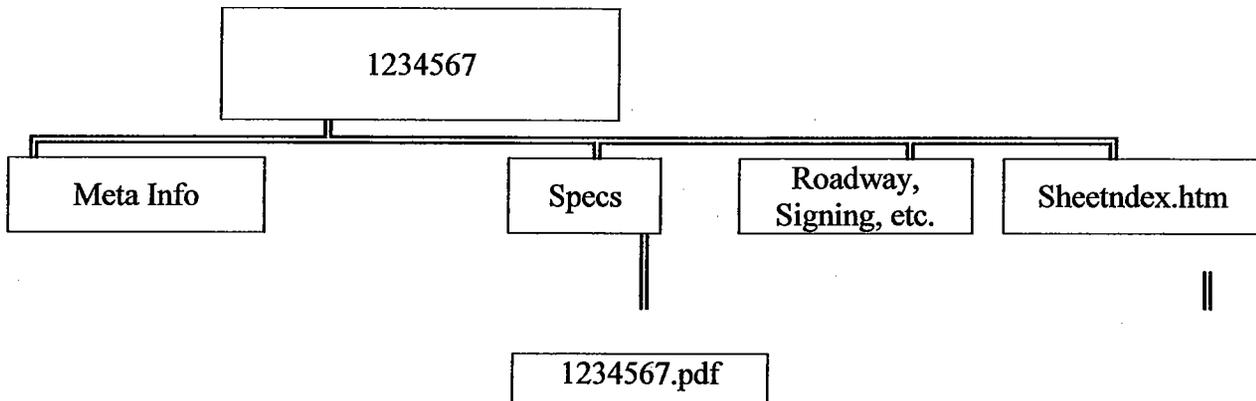
**SUPPLEMENT SPECIFICATIONS PACKAGE DIRECTORY STRUCTURE:**

**PLEASE NOTE: THERE ARE NO DASHES IN THE FPID NUMBER**



**PILOT PROJECT SPECIFICATIONS PACKAGE DIRECTORY STRUCTURE:**

**PLEASE NOTE: THERE ARE NO DASHES IN THE FPID NUMBER**



### **3.12. PAVEMENT DESIGN**

1. Evaluate the project scope and pavement requirements.
2. Evaluate the provided soil support value information for reliability.
3. Evaluate the provided traffic information for reliability.
4. Evaluate proposed materials to be used or considered.
5. If one or more of the items above does not meet requirements, request additional, new, or backup information (as needed) and re-evaluate preliminary design information.
6. Check pavement calculations.
7. Check contract plans to see if they are in agreement with the proposed pavement design
8. Check for proper drainage and encountered water and/or water table depth under roadway.
9. Check milling depth to insure proper crack removal.
10. Check for black base issues and/or consideration.
11. Check that constructability issues have been addressed, considered, or a constructability review has been completed.
12. Check that cross-slope correction has been addressed.
13. Evaluate constraints and/or special job specific considerations and compare options and/or solutions.
14. Review plans and pavement design with designer and/or consultant and Quality Assurance Department.
15. Evaluate special designs that may not be in our standards to ensure they meet or exceed FDOT criteria. (A multi-disciplinary approach may be required.)
16. Check that pavement designs meet statewide policies and standards. (Coordinate with Central Office Pavement Design and FHWA on a regular basis).
17. Make sure that data for the pavement design has been properly processed for quality control and approval. (Must be signed and sealed on final documents).

### **3.13. INTERSTATE MANAGEMENT & CONSULTANT PROJECT MANAGEMENT**

#### **Critical Monitoring Plan**

- Verify submittal package is complete.
- Verify QA/QC plans have been created and adhered to according to FDOT standards.
- Verify scope commitments and critical issues were incorporated into product.
- Review phase review comments to ensure reliability.
- Verify that all departments have had an opportunity to review plans.
- Do what it take to secure that the FDOT Team and Consultant Team are successful with Permits, Cost Estimates, R/W Requirements, Specification Package, Electronic Letting Package, etc.

#### **Public Involvement Activities for Project Managers**

- A Design Project Manager should be assigned to a project as the PD&E is in its last stages and prior to selection of the design firm.
- The Design Project Manager makes contact with the city, county and local stakeholders that are affected by the project.
- The Design Project Manager becomes familiar with issues and concerns that will affect local governments.
- When the Design firm is selected and the contract executed, the Design Project Manager introduces the firm to all issues and concerns for the project from the local government point of view.
- FDOT and the Design firm hold a 0% Design Team Meeting inviting pro-actively the city, county and stakeholders so that all will be aware of issues and concerns of the project and establish a partnering relationship with them.
- The Design Project Manager and the Design firm maintains a pro-active working relationship with the local governments as the design progresses, keeping the local governments informed of major decisions that occur as the design moves forward.
- Hold 30% and 60% Public Information Meetings inviting the local government to participate in the meetings.
- The Design Firm and Design present to the City Council and MPO an overview of the project between 30% and 60% design.

#### **4. TRAFFIC OPERATION GUIDELINES**

**Go to:**

**<http://d5web.d5.state.fl.us/operations/05/index.htm>**

- Guidelines for Signing and Pavement Markings Plan Preparation
- Guidelines for Traffic Signal Plan Preparations

**Note:** The updates will be on the website, the following is as of February 2008.

Florida Department of Transportation  
District 5

**Guidelines for  
Signing and Pavement  
Markings Plan Preparation**

**TABLE OF CONTENTS**

**1.0 INTRODUCTION**

**2.0 SIGNING AND PAVEMENT MARKING PLAN PREPARATION**

- 2.1 General**
- 2.2 Key Sheet**
- 2.3 Tabulation of Quantities**
- 2.4 General Notes/ Pay Item Notes**

**3.0 BIKE LANE DESIGNATIONS**

- 3.1 Various Types of Striping Classifications**
- 3.2 Use of the bike manual vs. Design Standards**

**4.0 TURN LANES**

- 4.1 Determining lengths of lane lines**
- 4.2 Use of "ONLY" pavement messages**
- 4.3 Bike lanes crossing right turn lanes**
- 4.4 Striping of taper**
- 4.5 Bi-directional turn lanes**
- 4.6 Continuous turn lanes across an intersection**

**5.0 SIGNALIZED INTERSECTIONS**

- 5.1 Bike Lanes at signals**
- 5.2 Crosswalks**
- 5.3 Guide striping**
- 5.4 Solid line between through lanes**
- 5.5 Stop bars**
- 5.6 Left turn Radius**
- 5.7 Signing**

**6.0 NON-SIGNALIZED INTERSECTIONS**

- 6.1 Design for future signalization**
- 6.2 Signs for intersections on divided roadways**
- 6.3 Signing**

**7.0 DIRECTIONAL MEDIAN OPENINGS**

- 7.1 Pavement Marking Design**
- 7.2 Signing Design**
- 7.3 Delineators**

**8.0 SIDE STREETS**

- 8.1 Pavement Marking Design**
- 8.2 Signing Design**

**9.0 SIGNING**

- 9.1 Guide Signs**
- 9.2 Speed Limit Signs**

**10.0 MISCELLANEOUS PAVEMENT MARKINGS**

- 10.1 Blue RPMs**

**REVISIONS**

## 1.0 INTRODUCTION

This document is to be used as a guide for the design and/or upgrade of signing and pavement markings on state roads. It is intended to augment and clarify information found in the **Florida Department of Transportation Design Standards, Standard Specifications for Road and Bridge Construction, Plans Preparation Manual, Manual on Uniform Traffic Control Devices (MUTCD)**, as well as current District 5 preferences. These guidelines address the actual design requirements for signing and pavement markings as well as the format for a plans package. In the event of a discrepancy in requirements between these preferences and the aforementioned references, the requirements set forth in this document should be considered as a District Five preference only and treated as such. This handbook is to be used as a guide and is not intended to replace sound engineering judgment nor is it intended to provide all of the information required to produce signing and pavement marking plans. The engineer of record should be fully competent in traffic and signing and pavement marking design prior to using this information to comply with District 5 preferences.

## **2.0 SIGNING AND PAVEMENT MARKING PLAN PREPARATION**

### **Purpose of this Chapter**

Chapter 23, Volume II of the Plans Preparation Manual (PPM) addresses how to prepare a Signing and Pavement Marking plan set for the Department. The following sections are used to expand or explain areas of this chapter of the PPM where questions have arisen.

### **2.1 General**

In general, signing and pavement marking plans are a component set of plans. In some instances, however, other components such as the signalization plans may be combined. An example would be the relooping of intersection(s) on a milling and resurfacing project. When the signalization work is minimal and the FDOT Project Manager concurs, the signalization work may be combined with the signing and marking plans. When the plans are combined a separate tabulation of quantities sheet and a separate CES printout is necessary for signalization items.

### **2.2 Key Sheet**

No comments at this time.

### **2.3 Tabulation of Quantities**

See current Basis of Estimates for updated notes that should be included in the Tabulation of Quantities.

Sign panel sizes and standard sign numbers should be shown and itemized in the Tabulation of Quantities.

### **2.4 General Notes/ Pay Item Notes**

A list of general notes is available for use on typical signing and pavement marking projects and can be obtained by contacting District 5 Traffic Operations. However, it is the designer's responsibility to read and edit the notes as needed for their specific project. Additionally, the designer should add any special notes that may apply to a special condition for the project.

## **4.0 TURN LANES**

### **4.1 Determining lengths of lane lines**

When determining the proper placement of lane lines for turn lanes, the Design Standard should be used. Specifically, index 301 and index 17346 are used to determine the line lengths. Care should be taken to review the information that is to be interpreted from each index. Index 17346 shows the placement of pavement arrows and the length of the lane lines. Index 301 shows the lengths of the lane lines and the opening to the turn lane for various approach speeds, as well as deceleration distances. Designer should use either the posted speed limit or the design speed (larger value) when determining the turn lane openings.

A 6'-10' white skip-stripe should be placed across all turn lane entrances ( $L_1$  Distance) where the lane line is terminated. If a bike lane is provided, refer to Design Standard 17346.

### **4.2 Use of "ONLY" pavement messages**

"ONLY" pavement messages are used as to provide notification to drivers that the travel lane has changed to a turn lane. This most often occurs at intersections with lane drops or at "T" intersections with separate right and left turn lanes. At these locations, the "ONLY" pavement messages should be placed on the pavement prior to the arrows as shown in index 17346.

Note that when both dual left turn lanes are developed separate from the travel lanes they should not have "ONLY" pavement messages. Generally when a travel lane becomes a turn lane should it have "ONLY" pavement messages. Right/Left Turn Lane Must Turn Right/Left signs are also used. In cases where existing "ONLY" messages are provided and do not meet the criteria stated above, consult District Five Traffic Operations before removing the existing pavement marking messages.

A solid 8-inch white lane line should be used to delineate the "dropped" lane. "Right/Left Lane Must Turn Right/Left" signs should be used to supplement the lane drop. Engineering judgment should be used in determining how far the solid 8-inch white line should be extended (suggest MUTCD Table 2C-4).

### **4.3 Bike lanes crossing right turn lanes**

One of the most important issues encountered by designers when designing bike lanes has to do with right turn lanes. The designer must properly stripe the lanes so that the bicyclists and the right turning vehicles can safely cross each other's paths. This striping configuration is shown in Index 17346 sheets 12 through 14.

Care should be taken to avoid placement of RPMs within bike lanes. Standard index 17352, 2 of 2 covers placement. With separate right turn lanes, there will be 2 sets of RPMs placed on both sides of the outer through lane with 1 set of RPMs in the separate right turn lane inside the left lane line.

Bike lanes adjacent to right turn lanes at a signalized intersection should be 5-feet wide. If the desired bike lane width results in an 11-foot right turn lane, then this is generally acceptable.

## **5.0 SIGNALIZED INTERSECTIONS**

### **5.1 Bike Lanes at signals**

The striping of bike lanes at signalized intersections is detailed in the bike manual. Most of the information needed is also shown in the Appendix of the manual. Loops are not required for bike lanes in District 5, unless currently existing or requested by Traffic Operations. Bike lanes adjacent to a right turn lane should be 5-foot wide when possible.

### **5.2 Crosswalks**

Pedestrian safety is a special design consideration. For this reason, District 5 has developed a position that crosswalks, which are often ignored, should only be placed at special locations. To accomplish this, the District only stripes crosswalks at signalized intersections, intersections within school zones, or locations based on engineering analysis or special need. These locations utilize the "Special Emphasis" shown in Index 17346 and have a preferred width of 10 feet. The designer should be sure to maintain the minimum 4-foot clearance between any crosswalk and a concurrent vehicle travel path. Crosswalk markings take precedence over gore areas and guide striping. Crosswalks shall be striped in a manner that they are parallel to the wheel path of through vehicles.

### **5.3 Guide striping**

Within District 5, guide striping is only to be used in two conditions. First, it should be placed between multiple turn lanes to guide the drivers as they complete the maneuver. For example, a dual turn lane would have 1 line of guide stripe between the turn lanes. Otherwise, it should only be used for circumstances where there is a special need to provide guidance to vehicles as they travel through an intersection that is skewed, has a long or offset travel path, or when visibility of the receiving lane is obstructed.

### **5.4 Solid line between through lanes**

As vehicles approach a signalized intersection on a multi-through lane approach, the skip stripe between the travel lanes turns to a solid line. The line should extend from the stop bar to a distance based on the posted speed limit. Use the suggested distance for the closest set of advance loops as a guide.

### **5.5 Stop bars**

Although there are many non-standard intersections within the District, it is desirable to maintain consistency of stop bar placement throughout the area. In order to do so, these general guidelines should be followed:

- Stop bars should be perpendicular to the side street travel path.
- It is allowable to stagger stop bars between through and left lanes to meet turn radii.
- Stop bars should extend across bike lanes but not through gore areas or onto paved shoulders.
- Ensure 4-foot of clearance is maintained between the stop bar and the parallel crosswalk or theoretical crosswalk

## **5.6 Left turn Radius**

At signalized intersections, the designer should always try to provide a minimum inside radius that will accommodate the vehicle-type that is using the intersection. The radius should be used to place the stop bars and other striping around the intersection.

For locations that require triple-left turn lanes, the turn radii should not be parallel. The outside turn radius should be smaller than the inside radius to accommodate large trucks.

## **5.7 Signing**

Within District 5, Keep Right signs and 9-button delineators are required on raised median noses at signalized intersections to provide guidance to motorists.

For roadways approaching a traffic signal with three or more through lanes in urban/suburban areas, advance street name signs are generally required unless spacing precludes. The advance street name signs (i.e. Main Street – Next Signal) should be placed at the beginning of the longest turn lane approaching the intersection, but generally not greater than 200 feet from the beginning of the turn lane. Preferred placement of the signs is in the median; however, installing the signs along the outside edge of the roadway is also acceptable. For additional information refer to Traffic Engineering Manual (Section 2.37).

## **6.0 NON-SIGNALIZED INTERSECTIONS**

### **6.1 Design for future signalization**

Traffic signals are being installed around the state on a regular basis. Often times an unsignalized intersection will be signalized some time in the future. In order to save time and money in the future, a few simple issues should be considered when striping unsignalized intersections.

For the mainline, the designer should determine the position for future stop bars. These locations should allow for future crosswalk placement (use theoretical crosswalk). From these points, lane lines and pavement arrows can be properly placed in the turn lanes. The theoretical stop bar locations should allow for a proper inside turn radius for left turn vehicles. This is especially true when determining median location at an intersection.

For the side streets, stop bars should be placed according to the MUTCD requirements and should allow proper spacing for future crosswalks. No crosswalks should be placed at unsignalized intersections unless within a reduced speed school zone or there is a demonstrated need determined by Traffic Operations. In such locations, crosswalks should only be installed on the required approaches to the intersection.

### **6.2 Signs for intersections on divided roadways**

The Design Standards and the MUTCD provide specific direction for signing non-signalized intersections. In addition, District 5 has preferences that apply to non-signalized intersections on divided roadways.

Note that with each of these configurations, additional signs may be used. For example, street name signs may be added. Care should be taken to ensure that the additional signs do not block the visibility of the signs shown in these details.

Provide skip striping across median openings for all divided sections.

### **6.3 Signing**

At unsignalized openings, in lieu of Keep Right (R4-7) signs and 9-button delineators (OM1-1), double-sided (yellow/green) tubular delineators (705-71) should be placed in median noses positioned so the green faces approaching traffic and the yellow facing departing traffic. There will also be white (single-sided) delineators and green (single-sided) delineators in directional island noses.

Keep Right (R4-7) and 9-button delineators (OM1-1), should generally be used at signalized intersections and at the beginning of a raised median (i.e. transition from a 2-lane to four-lane section, end of a bi-directional left turn lane, etc.)

## **7.0 DIRECTIONAL MEDIAN OPENINGS**

### **7.1 Pavement Marking Design**

The pavement markings around directional median openings should incorporate each of the following:

- Diagonal stripes within gore areas installed at 10-foot spacing.
- White nose paint on the island nose(s) facing the passenger side of approaching left turning vehicles.

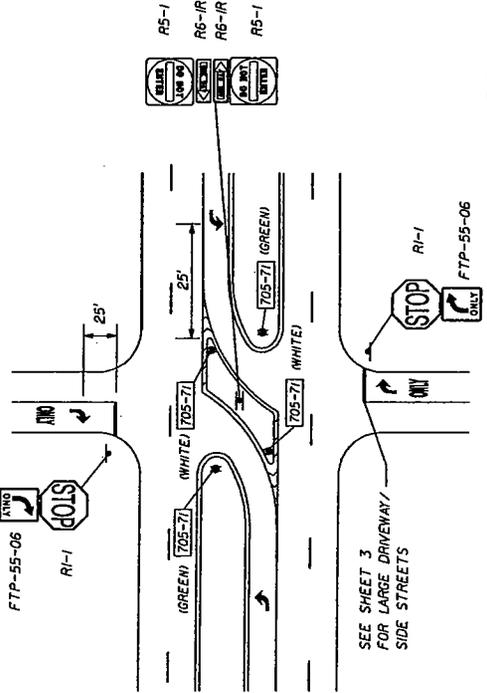
### **7.2 Signing Design**

The signs at the directional median modifications should comply with the District 5 details shown below. While developing the plans, the designer should consider the paths of u-turning vehicles and keep the signs away from the median noses. No left turn and No U-turn signs should be placed approximately 100 feet before the wrong way approach of a directional opening.

### **7.3 Delineators**

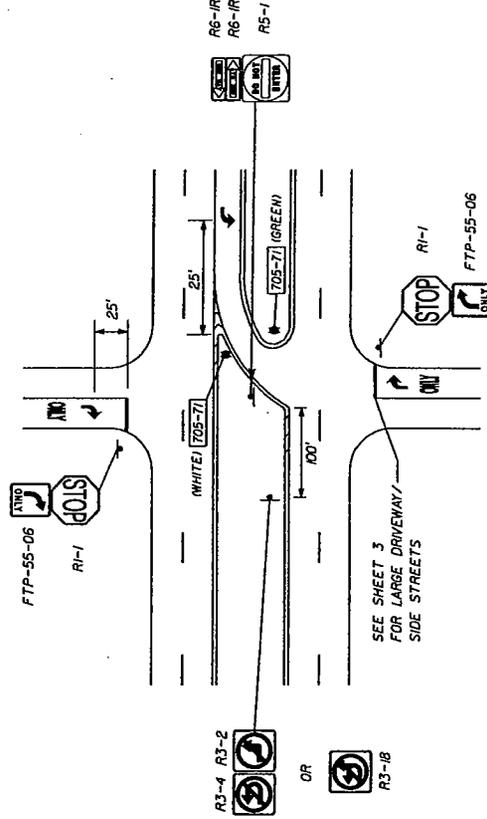
In addition to signs, delineators should be placed at specific locations at directional median openings. Specifically, tubular white (single-sided) delineators (705-71) should be placed in directional island noses. Green tubular delineators (single-sided) should be in the median so green faces approaching left turn traffic.

RPMs are to be placed according to Index 17352.



N.T.S.

BI-DIRECTIONAL MEDIAN  
SIGNING



N.T.S.

DIRECTIONAL MEDIAN  
SIGNING

NOTES:

1. TO BE SIGNED & STRIPED AT THE DISCRETION OF THE PROFESSIONAL ENGINEER.
2. R4-7 WITH OMI-1 SHOULD ONLY BE USED AT SIGNALIZED INTERSECTIONS AND BEGINNING OF PHYSICAL MEDIAN (I.E. TWO-LANE TO FOUR-LANE TRANSITIONS, END OF BI-DIRECTIONAL LEFT TURN LANE, ETC.).

REVISED 1/29/08

| REVISIONS |    | DESCRIPTION |             |
|-----------|----|-------------|-------------|
| DATE      | BY | DATE        | DESCRIPTION |
|           |    |             |             |

|                              |        |                       |  |
|------------------------------|--------|-----------------------|--|
| STATE OF FLORIDA             |        | DISTRICT 5 GUIDELINES |  |
| DEPARTMENT OF TRANSPORTATION |        | FOR MEDIAN SIGNING    |  |
| ROAD NO.                     | COUNTY | FINANCIAL PROJECT ID  |  |
|                              |        |                       |  |

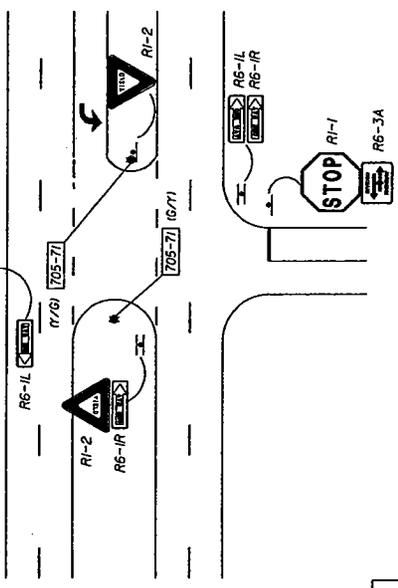
|      |    |      |             |
|------|----|------|-------------|
| DATE | BY | DATE | DESCRIPTION |
|      |    |      |             |

|           |   |
|-----------|---|
| SHEET NO. | 1 |
|-----------|---|

1/29/2008 12:06 PM S:\Traffic Operations\080308\080308\080308-7.mxd.dgn

9-BUTTON DELINEATORS SHALL BE PLACED IN RURAL AREAS & CONSIDERED IN URBAN AREAS

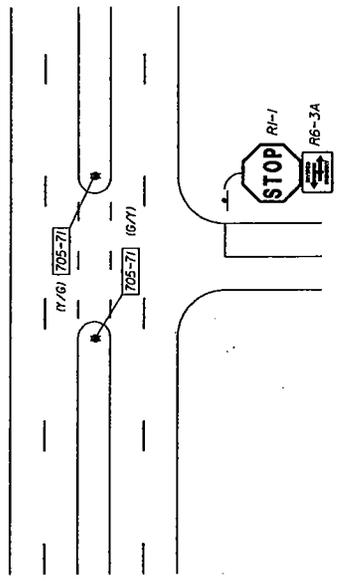


SCENARIO 1  
MEDIAN NOSE  
30 FEET  
OR GREATER

FOR MEDIAN NOSES/WIDTHS THAT ARE BETWEEN THE TWO SCENARIOS, USE SCENARIO ONE.

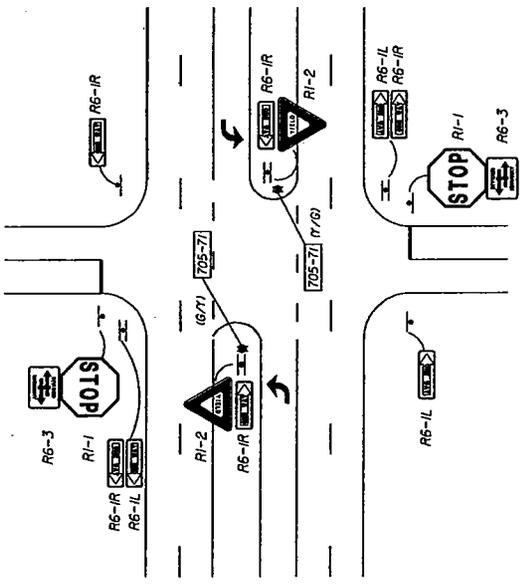
N.T.S.

9-BUTTON DELINEATORS SHALL BE PLACED IN RURAL AREAS & CONSIDERED IN URBAN AREAS

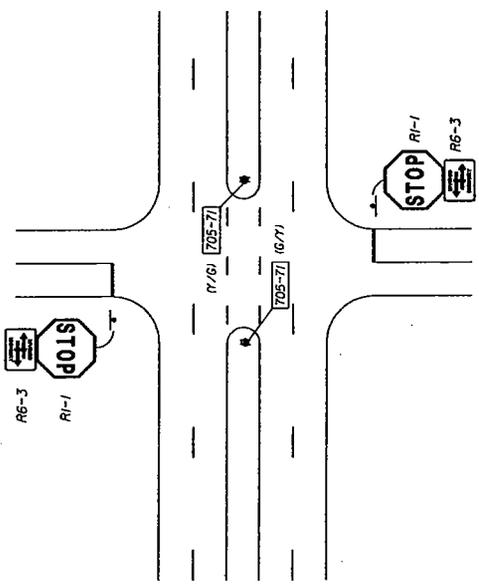


SCENARIO 2  
MEDIAN WIDTHS  
LESS THAN  
30 FEET

N.T.S.



N.T.S.



N.T.S.

REVISED 1/29/08

| DATE | BY | DESCRIPTION | REVISIONS | DATE | BY | DESCRIPTION |
|------|----|-------------|-----------|------|----|-------------|
|      |    |             |           |      |    |             |

|                   |        |                              |  |
|-------------------|--------|------------------------------|--|
| STATES OF FLORIDA |        | DEPARTMENT OF TRANSPORTATION |  |
| ROAD NO.          | COUNTY | FINANCIAL PROJECT ID         |  |

|         |         |        |  |
|---------|---------|--------|--|
| 3/22/08 | 3/22/08 | 105627 |  |
|---------|---------|--------|--|

|  |  |           |   |
|--|--|-----------|---|
| DISTRICT 5 GUIDELINES FOR MEDIAN SIGNING |  | SHEET NO. | 2 |
|--|--|-----------|---|



Florida Department of Transportation  
District 5

**Guidelines for Traffic Signal  
Plan Preparation**

**TABLE OF CONTENTS**

**1.0 INTRODUCTION**

**2.0 TRAFFIC SIGNAL PLAN PREPARATION**

- 2.1 General**
- 2.2 Key Sheet**
- 2.3 Tabulation of Quantities**
- 2.4 General Notes/ Pay Item Notes**
- 2.5 Plan Sheets**
- 2.6 Interconnect/Communication Plan**
- 2.7 Mast Arm Sheets/ Pole Schedules**

**3.0 SIGNAL POLES – STRAIN POLES AND MAST ARMS**

- 3.1 Location of Traffic Signal Poles**
- 3.2 Design Procedure for Concrete Strain Poles**
- 3.3 Joint Use Poles**
- 3.4 Mast Arm Signal Design**
- 3.5 Incorporating Luminaires on Strain Poles and Mast Arms**
- 3.6 Location of Power Services**

**4.0 SIGNAL HEAD PLACEMENT**

- 4.1 Introduction**
- 4.2 Legend**
- 4.3 Traffic Signal Head Placement for “Plus” Intersections**
- 4.4 Traffic Signal Head Placement for “T” Intersections**

**2.5 Plan Sheets**

**2.5.1 Format and Scale**

Generally 1" = 40' is used; however other **legible** scales are acceptable.

**2.5.2 Required Information**

No comments at this time.

**2.6 Interconnect/Communication Plan**

Communication Plans shall show all driveways in which conduit will need to be installed under pavement.

Interconnect conduit runs are to be shown on the intersection signal plan. Using match lines, the communication sheets should show the conduit runs between intersections. With this method, all work at a signalized intersection will be shown on a single plan sheet. Effort should be made to combine conduit trenches and pavement crossings whenever possible.

**2.7 Mast Arm Sheets/ Pole Schedules**

No comments at this time.

### 3.0 SIGNAL POLES – Strain Poles and Mast Arms

#### 3.1 Location of Traffic Signal Poles

The location of signal poles should be determined early in the design process. The designer will need to consider many aspects while finding the best position for each pole. Some of the items that need to be considered include:

- Clear zone requirements (the designer may need to know if the project qualifies as a RRR project, although full clear zone should be met whenever possible)
- Positioning of the crosswalks and the pedestrian features
- Underground utilities (conflicting with proposed poles)
- Required horizontal and vertical separation from overhead utilities
- Pipes and drainage structures (existing & proposed)
- Existing irrigation systems
- Buildings and building foundations
- Access to fire hydrants
- Embankments and slopes (Deduct ditch depth from foundation depth when poles are adjacent.)
- Future road widening projects – Place poles near the R/W where appropriate. Consider future connections.
- Accessibility during construction and maintenance operations
- Ability to place signal heads in the proper locations with the appropriate spacing from the stop bar (on far side of the intersection, not less than  $\frac{2}{3}$  of the intersection width).
- Ability to construct proposed signal before removing existing signal

While the designer is reviewing these and other field conditions, consideration should also be given to the constructibility of the project. During construction, one of the most difficult tasks is setting the poles. During pole installation, the pole must be lifted from a truck or staging area and moved to its proposed location. Since the pole is hanging below the crane, overhead utility lines in the vicinity can make construction very difficult and pose safety concerns. Whenever possible, poles should not be placed under or near overhead utility lines. Many times, however, these conflicts cannot be avoided. The designer should still try to locate the poles so that the conflicts with utilities will be minimized as much as possible.

Once the preliminary pole locations have been determined, a soft-dig utility verification should be completed for each pole location. In all signalization designs, the designers should attempt to place the poles in locations that will minimize the impacts to existing utilities that are not already being relocated for other reasons. A qualified design representative should be present during the soft-dig verification process to determine a new proposed location if underground utilities are found. The goal of this process is not just to determine the location of the utilities, but also to avoid them and determine a clear location (4 feet in diameter) for the poles. **For strain poles and mast arms, the**

**engineer is responsible for verifying that the pole locations are clear of utilities (or that the District Utilities Office is aware of the conflicts).**

While it is desirable to avoid utility impacts when reasonable, the design standards and sound engineering judgment should not be compromised for the sake of existing utilities. After the final pole locations are determined, the soft-dig reports should be forwarded to the District Utilities Engineer.

### **3.2 Design Procedure for Concrete Strain Poles**

Before strain poles can be designed for a particular intersection, many aspects of the design must be determined. The span wire and signal head configuration must be available along with the specifics of any signs that are to be placed on the structure. The designer will also need to know the relative elevation at each pole location as well as the critical head elevation(s).

Box span configuration should be strived for in each strain pole design. There are numerous advantages to box-spans designs: ease of maintenance, signal head sight distance, ability to utilize smaller poles, and ability to withstand stronger winds. If a box-span design cannot be achieved because of various design issues (i.e. R/W, utilities, sight distance), then alternative methods should be explored, such as X-span or suspended box. Traffic Ops approval is needed for any diagonal or dual diagonal designs.

The designer should also evaluate the potential for future signalization changes to the spans. For example, future left turn phases may be added. In this situation the span should be designed to accommodate those future displays (if possible). Additionally, the poles for flashing beacon spans should be designed to accommodate future signalization. The messenger wire should be installed in the location that will accommodate the future three-section signal heads. This is important to note since one-section signal heads hang less than 2 feet below the messenger while 3 and 5- section heads hang approximately 4.0 feet and 4.5 feet below the cable.

Once the necessary data has been compiled, the ATLAS strain pole program should be utilized to select and design the pole. Only qualified individuals that are familiar with the intricacies of the ATLAS program should design poles. Modification to the input file will be required to model the specific intersection conditions. The engineer of record will be responsible for review of the output file and determining the proper pole and foundation designs. The traffic engineer will be responsible for verifying that the critical heads meet the required clearances.

Two-point connection should be used in District 5. Single-point connection is permitted; however, the designer should coordinate with Traffic Operations and the maintaining agency for concurrence prior to submitting initial plans.

The default setting in ATLAS is 5% sag. District 5 typically requires increasing the sag to 6%.

### 3.3 Joint Use Poles

At some locations, utility companies may request that we share a pole so that they will not be required to relocate their overhead utilities. The Department may also desire to share a pole to "clean up" the intersection. This "joint use" pole will need to be designed to accommodate the loading of the signal configuration and the utility lines. While coordinating with the utility owner, several design aspects will need to be discussed with some of the resolutions detailed in the plans. Here are a few of the aspects that should be coordinated:

- Exact location of the pole(s)
- Elevations of the signalization attachment points
- Required vertical separation between the signal wires and the utility lines
- Rotation of pole (usually installed parallel to the roadway with symmetrical strength to each face)
- How existing utilities will be handled during construction

Notes and/or details should be added to the plans to specify who is responsible for each aspect of the pole installation. This process includes items such as:

- Adjustment of the existing utility lines and when they are to occur
- Adjustment or replacement of adjacent poles
- Removal of an existing pole
- Installation of the joint use pole
- Protection of existing lines during installation
- Attachment of utility lines to the joint use pole - 45° attachments will require a special bracket (must be cleared through the Utilities Office); 90° attachments may require a special pole design with more than one load face
- Need of any predrilled holes through pole

### 3.4 Mast Arm Signal Design

Mast arm signal pole locations should be determined incorporating the considerations and verification process described in Section 3.1.

One of the primary characteristics of a mast arm structure is the uniqueness of its design. Mast arm structures are generally made for a specific location at a specific intersection. If the pole location and/or elevation changes during the construction process, often times the structure will be an improper length or height to be used. For this reason, it is critical the design information used to develop the structure's dimensions is correct. The traffic engineer will be responsible for verifying that the critical heads meet the required clearances (see Figure 3.4.1). Since this requirement applies to each arm, poles with dual arms may have to be mounted at different heights. To verify that the poles are designed correctly, cross sections should be evaluated for each pole location.

Note that the distance between the arm and the bottom of the signal head is different from the distance between the messenger cable and the bottom of the head on a span wire (see Figure 3.4.2). Coordination with the structural designer will be very important to verify that attachment requirements can be properly accommodated.

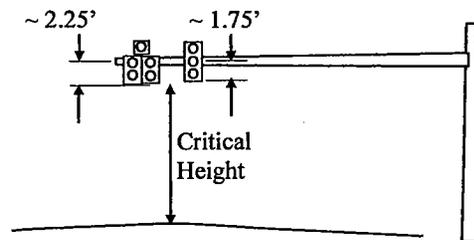


Figure 3.4.1

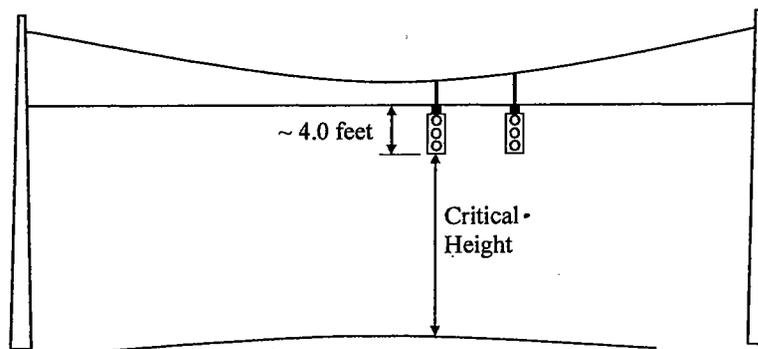


Figure 3.4.2

The Department has developed standard designs for mast arm structures. These configurations will provide benefits in the future such as decreased procurement time and ease of design for modification to existing structures. These standards are available through the FDOT web site and should be used whenever possible. However, the arms can be longer when needed. The maximum acceptable length of an arm is approximately 85 feet. It is preferable, however, to keep the length below 80 feet in length. Detailed instructions on pole and arm selections are included in the standards. When the standard designs are not applicable to a specific location (i.e., longer or taller than provided in the Design Standards, Structures Manual, and the PPM), a special structural design will be required. This design may only be completed by a qualified structural engineer.

After the pole locations have been determined, the proposed arms and signal heads should be laid out. The length of the arm should not only accommodate the proposed signal heads and signs, but also potential future heads and signs. For example, the designer should consider the possibility of future left turn phases and the possibility of

widening into the median for an additional left turn lane. Each of the proposed and future heads should be placed as described in Section 4. At least 2 feet of arm should extend out from the furthest signal head (proposed or future).

Once the proposed and future signal head locations have been determined, the mast arm schedule should be completed. The schedule provides pole and arm design details such as signal head and pedestrian head placements, types of signal heads, mounting configurations, etc. This information is used to determine if one of the standard arms can be used. While it is desirable to utilize the standard pole and arm configurations whenever possible, the design standards and sound engineering judgment should not be compromised for the sake of using the standard poles and arms. Designers also need to consider ped head placement as they need to remain visible to approaching pedestrians throughout the crosswalk path. Ideally, they should be within 5 feet of the extended crosswalk, and not more than 10 feet away.

### **3.5 Incorporating Luminaires on Strain Poles and Mast Arms**

Luminaires should be incorporated on the strain poles or mast arms only if requested by the Department and/or the maintaining agency. For mast arms, the standard configurations allow for luminaires only under certain configurations. For strain poles, the addition of luminaires would need to be incorporated into the pole design.

If it has been determined that luminaires will be utilized on the signal poles in a project, several design elements should be addressed. These include:

- Power provisions for luminaires
  - Luminaires require power separate from that provided for the traffic signal
  - A separate load center may be needed for luminaires
  - Determine how lights are to be activated (if by photoelectric cell, no more than one per intersection)
  - If they are powered by the signals power service, an additional breaker for the illuminated signs shall be used, if available.
- Type of fixtures and wattage
- Mounting heights
- Mounting brackets
- Conflicts with overhead utilities
- Conflicts with signal cable spans

Consideration should also be given to how these light fixtures will affect existing lighting systems. It may be necessary to remove existing light poles located near the proposed signal poles. In those cases, modifications to the existing conductors, conduits, and pull boxes will also need to be addressed.

If the proposed light fixtures are to be added to an existing lighting system, voltage calculations and conductor sizes will need to be addressed. Consideration should also be given to the photometric light levels in the vicinity of the intersection. These calculations should only be completed by a qualified engineer.

### **3.6 Location of Power Services**

For all new signal installations and most signal rebuilds, it will be necessary to install a new power service. The type of power service depends on the existing conditions and the type of signal structures being installed. In all cases, the designer should attempt to locate existing power transformers to supply power to the intersection. Coordination with utility owners will be required to facilitate power hookup.

For strain pole installations, the power service can usually be mounted to the strain pole with the power lines installed aerially from the utility pole (639-1-12). However, for long spans, such an installation may impose unacceptable moment on the existing utility pole. Under these conditions, another pole may need to be installed or the power may need to be run underground (639-1-22).

For mast arm installations, the power service should be run underground with the power service mounted on a separate concrete pedestal. It is not acceptable to mount the power service on a metal object such as the side of the cabinet or on a mast arm pole.

Note that all power installations must meet the requirements of the National Electrical Code (NEC) in addition to the FDOT requirements.

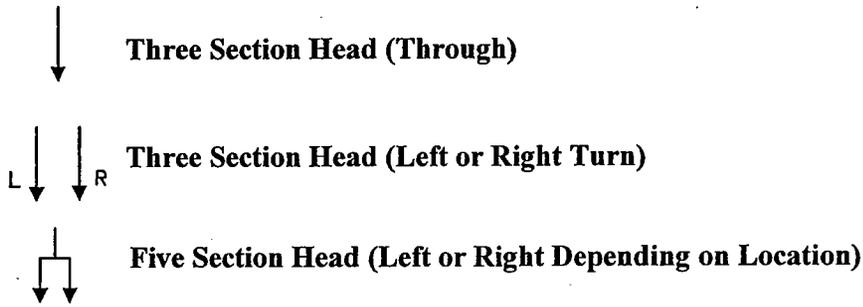
## 4.0 SIGNAL HEAD PLACEMENT

### 4.1 Introduction

The basic rules governing the requirements regarding overhead signal indications can be found in the Manual on Uniform Traffic Control Devices (MUTCD). The minimum requirements stated in the MUTCD should always be adhered to.

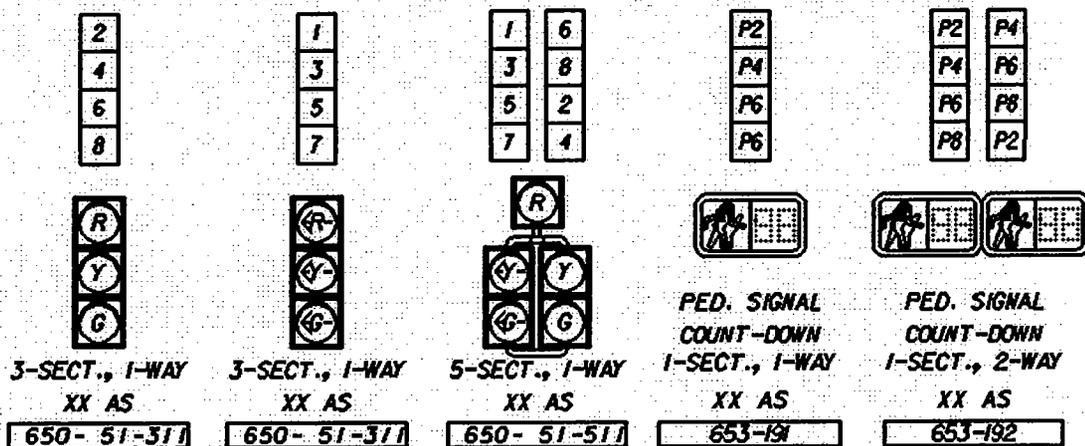
This section deals with standard overhead configurations for standard intersection designs. The designer should determine how these guidelines relate to the subject intersection. These figures should be used as a guide and are not intended to replace sound engineering judgment.

### 4.2 Legend



Note the "L" and "R" for the left and right turn displays are being used in this section only for simplicity and should not be shown on a plan sheet. Instead, signal head details should be included for each head installed. Following are some examples of signal head and pedestrian head details that are required on all signal plans, as appropriate. All signal displays shall be LED, including pedestrian signal heads.

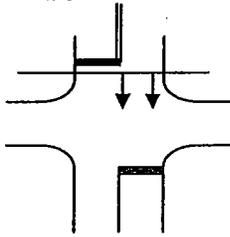
### SIGNAL HEAD DETAILS



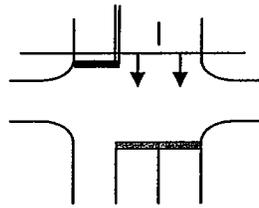
**4.3 Traffic Signal Head Placement for “Plus” Intersections**

This section provides guidance for signal head placement at typical “plus” intersections. These figures represent District 5 preferences under normal conditions. For many applications, the designer will utilize one or more of the figures shown to determine the appropriate placement for a specific intersection. These figures should be used as a guide and should never replace sound engineering judgment.

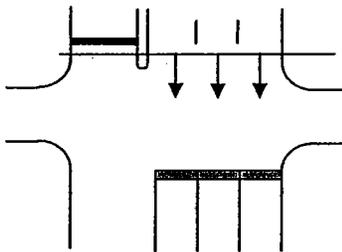
**4.3.1 Approach without Turn Lanes - Not Split Phased**



**Single Through Lane**  
Signal heads to be aligned between the lane line and the edge line.

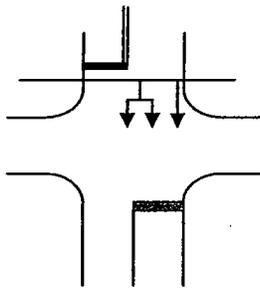


**Two Through Lanes**  
Signal heads to be centered over each lane.

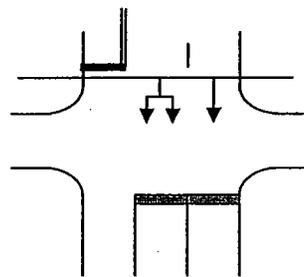


**Three Through Lanes**  
Signal heads centered over lanes.

**4.3.2 Approach without Turn Lanes – Protected Permitted or Split Phased**

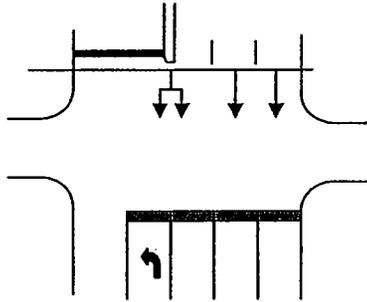


**Single Through Lane**  
Signal heads to be aligned between the lane line and the edge line.



**Two Through Lanes**  
Signal heads to be centered over each lane.

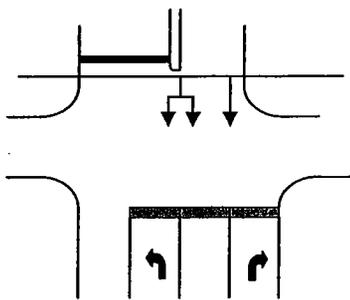
**4.3.3 One Left Turn Lane – Protected Permitted or Split Phased**



**Three Through Lanes**

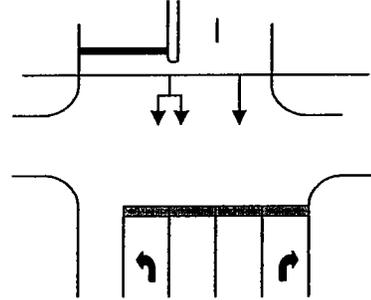
5 Section to be centered over the lane line. 3 Sections to be centered over outside through lanes.

**4.3.4 Two Turn Lanes (Left & Right) – Protected Permitted or Split Phased**



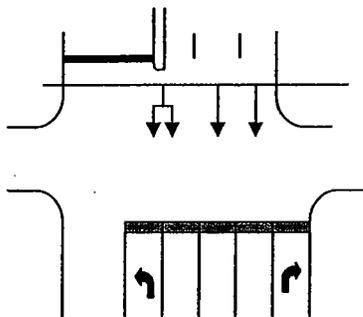
**Single Through Lane**

5 Section to be centered over the lane line. Three Section to be placed over the lane line.



**Two Through Lanes**

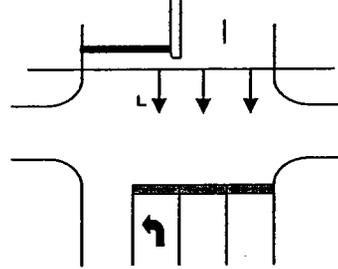
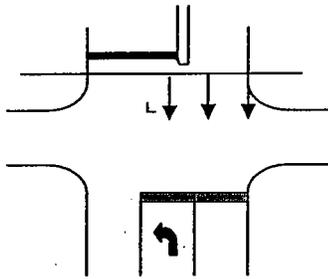
5 Section to be centered over the lane line. 3 Section to be centered over the outside through lane.



**Three Through Lanes**

5 Section to be centered over the lane line. 3 Sections to be centered over outside through lanes.

**4.3.5 One Left Turn Lane – Protected/ Not Split Phased**

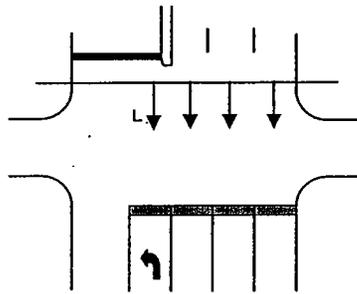


**Single Through Lane**

3 Section (left) to be over the turn lane. 3 Section (throughs) to be over the through lane.

**Two Through Lanes**

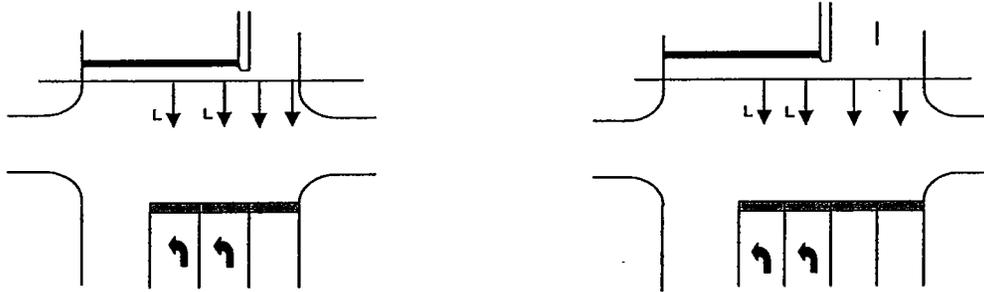
All heads to be centered over their respective lanes.



**Three Through Lanes**

All signal heads to be centered over their respective lanes.

**4.3.6 Dual Left Turn Lanes – Protected or Split Phased**

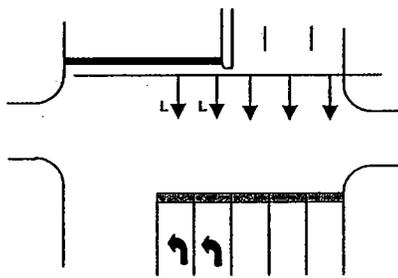


**Single Through Lane**

3 Section (lefts) to be centered over their respective lanes. The 3 Section (throughs) to be placed over the through lane. (Maintain 8' min. head separation.)

**Two Through Lanes**

All signal heads to be centered over their respective lanes.



**Three Through Lanes**

All signal heads to be centered over their respective lanes.

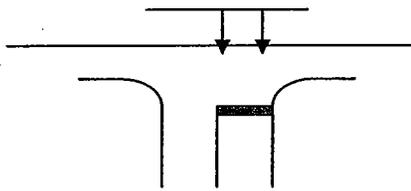
**4.3.7 Dual Left Turn Lanes and a Right Turn Lane – Protected or Split Phased**

The addition of a right turn lane should be handled per section 4.3.6 with no additional signal heads under normal conditions. If the right turn lane is to be signaled with an overlap, the right-most 3 section head should be replaced with a 5 section on the lane line between the right turn lane and the through lane.

**4.4 Traffic Signal Head Placement for "T" Intersections**

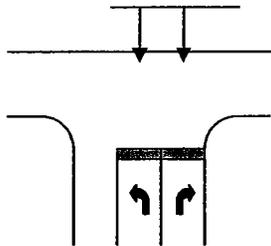
This section provides guidance for signal head placement at typical "T" intersections. These figures represent District 5 preferences under normal conditions. For many applications, the designer will utilize one or more of the figures shown to determine the appropriate placement for a specific intersection. These figures should be used as a guide and should never replace sound engineering judgment.

**4.4.1 Single Lane Approach**



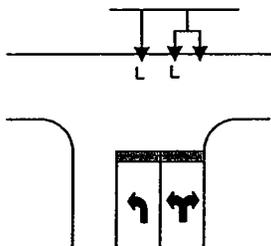
**Single Approach Lane**  
Signal heads to be aligned between the lane line and the edge line.

**4.4.2 Two Lane Approach**



**Two Approach Lanes**  
Signal heads to be centered over each lane.

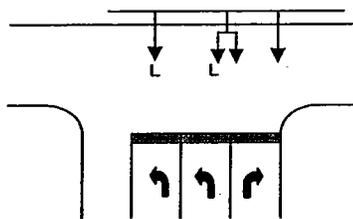
**4.4.3 One Designated and One Shared Turn Lane**



**Two Approach Lanes**  
Signal heads to be centered over each lane. Provide dual arrow indications for dual turn lanes.

\* Make sure that movements do not conflict with pedestrian phases.

**4.4.4 Dual Turn Lanes and a Single Turn Lane**

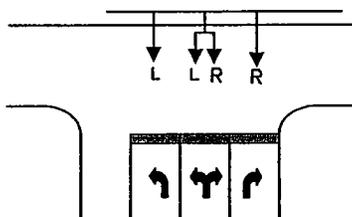


**Three Approach Lanes**

5 section centered over lane line separating movements. Center inside 3 section on inside left lane and outside 3-section minimum of 8 feet from 5-section.

\* Make sure that movements do not conflict with pedestrian phases.

**4.4.5 Dual Right and Left Turns with Shared Center Lane**



**Three Approach Lanes**

Signal heads centered over each lane.

\* Make sure that movements do not conflict with pedestrian phases.

**4.5 Traffic Signal Head Placement for Skewed Intersections**

Traffic signal heads at skewed intersections should be placed in such a way that the drivers will clearly understand which signal is providing guidance for their approach. The signal displays should be positioned so that inappropriate approaches cannot see them. If this is not possible, special signal heads should be used. Some of the specialized equipment available to facilitate this includes attachable louvers and optically programmed heads. The maintaining agency should be consulted to determine if they have a preference in this selection.

#### 4.6 Traffic Signal Head Placement for Misaligned Intersections

At many intersections, the approach lanes and the receiving lanes do not line up exactly. Under these conditions, the signal head placements in Section 4.3 should still be considered, but the exact placement should be based on the specific geometry of the intersection.

The signal head placements should consider items such as:

- Visibility for the approaching drivers.
- Providing guidance toward the acceptance lanes on the opposite side of the intersection. (See Figure 4.6.1 below)
- Verifying that the proposed head placement will not guide the driver toward the approach lanes on the opposite side of the intersection. This is especially important when median treatments exist. (See Figure 4.6.2 below)

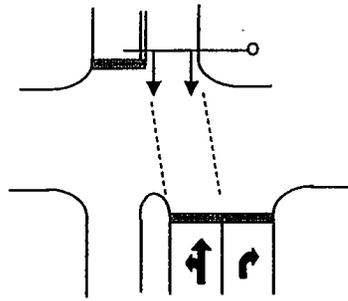


Figure 4.6.1

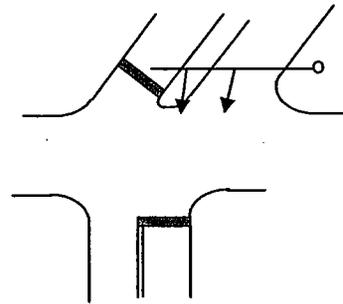


Figure 4.6.2

- In some cases, it will be appropriate to utilize additional signal displays such as nearside signal heads. Nearside heads may be needed if a curve does not allow for the signal heads to be visible within the AASHTO stopping sight distance requirements. Advance signing should also be considered in these circumstances.
- When reconfiguring an existing signal, the designer may decide to request a change in phasing (i.e., right turn overlaps, eliminating split phasing). The District Traffic Operations Engineer must approve any phase changes on the State Road System before they can legally be implemented. If an existing signal is split phased, the traffic engineer should always consider the possibility of removing the geometric constraints and if beneficial, removing the split phasing.
- Also try to avoid the placement of 2-way heads.

## 5.0 PAVEMENT MARKINGS AND SUPPLEMENTAL SIGNS

### 5.1 Pavement Markings

When making traffic signal modifications at an intersection, the engineer should review the existing pavement markings at the intersection. Even if the intersection is already signalized, modifications may be necessary to reflect current standards.

When reviewing the existing and/or proposed pavement markings, the following items should be verified:

- The inside radius for left turns should accommodate the appropriate design vehicle-type at the intersection except at minor local streets with no large trucks.
- A minimum of 8 feet separation between concurrent opposing left turn movements.
- A minimum of 4 feet separation between the travel lane and the concurrent crosswalk.
- Separation between the travel lane and the opposing stop bars (assuming no crosswalks) should accommodate a theoretical crosswalk.
- Skip stripe guidelines are only provided between dual left turn lanes unless other specific reasons require them.
- Crosswalks at signalized intersections should utilize the "special emphasis" type markings as shown in the standard index.
- Stop bars should be placed perpendicular to the lane. Staggered stop bars are allowed. In some cases, the loop may need to be moved significantly ahead of the stop bar.
- If loops are being cut, any affected pavement markings (i.e., stop bars and arrows) should be completely restriped after the loop is installed.

In general, new signals will require the addition of stop bars and the modification of existing pavement markings. All pavement markings between the stop bars generally should be removed. This specifically applies to 10'-30' skip stripe and other lane lines that extend into the intersection.

The designer should examine all existing pavement markings that are to remain and determine if they need to be restriped. Work that is to be done in the intersection also may damage existing markings that would have otherwise been acceptable. For example, when loops are cut into existing pavement, the existing pavement markings are usually significantly destroyed. For this reason, the designer should always restripe the stop bar, crosswalk, and any pavement arrows that will be cut during loop installations.

### 5.2 Signs

During the development of signalization plans, the designer should carefully examine the existing signs on each of the approaches. Many times, signs far from the intersection need to be removed during the signal installation. An example is a "stop ahead" (W3-1a) sign that may be placed several hundred feet away from the intersection on the side street.

“Yield” signs that are placed within wide medians should be removed unless there is a special reason to keep them. “Keep right” (R4-7) signs with nine button delineators should be installed at the median noses. If a circular green display is positioned for a left turn movement, a “Left Turn Must Yield on Green” sign should be considered when a left turn phase is removed or changed from a protected only to a protected-permissive operation. Additionally, the designer should ensure that other signs at the intersection meet current design standards. These signs include “Yield” signs and crosswalk warning signs.

### 5.3 Street Name Signs

Street name signs should be installed on the concrete strain poles or on the mast arms. The signs should be placed on separate arms mounted to the pole.

When designing the signs, specific sizes are used. The sign panels should be 18 inches tall by 48 or 72 inches wide when two attachment points are possible.

For three lane approaches (not including turn lanes), advance street name signs are required. These signs are usually placed upstream to the beginning of the turn lanes to inform motorists of the upcoming intersecting side street. These signs should use 8” upper and 6” lower case letters in the E-modified font for street name. Below the name, 6” upper case letters should read NEXT SIGNAL using the series E font. District 5 policy is to use breakaway supports for NEXT SIGNAL and other multi-post signs. An example of a NEXT SIGNAL is shown below:



### 5.4 Sign Illumination

In some locations, street name signs are installed with internal light fixtures to illuminate the sign. If modifications are done to a signal with such signs, they should be replaced in kind. Also, if modifying or installing a signal in an area that already has internally illuminated signs at nearby intersections, the maintaining agency should be contacted to determine if that type of sign should be included at the intersection to be modified. If included, the designer should provide specifics regarding the power required to operate the signs. Items to be considered include:

- Provide a separate breaker for the internally illuminated signs.
- Verify that the sign mounting location will not block the view of other signs or signals.

### 5.5 Variable Messages

When adding a new signal, consideration should be given to providing a variable message sign (VMS) in advance of the intersection to warn motorists of the new signal. Such signs would only be used immediately after the signal has been turned on and is fully-operational. The intent of the signs is to reduce the potential for rear end collisions by motorists who are familiar with the pre-signalized intersection. After approximately 2 weeks, the VMS should be removed.

#### Message Example

(Panel 1)

**NEW**

**SIGNAL**

**AHEAD**

Please note that the message on the VMS shall flash, opposed to a steady message. This will help drivers identify the message on the VMS.

## 6.0 LOOP ASSEMBLIES

### 6.1 Introduction

There are many ways to provide actuation at a traffic signal. Inductance loops are the most often used method in Florida. There are, however, many different shapes and placements that vary from district to district. This chapter is intended to provide guidance for the typical loop placement in District Five. There may be appropriate reasons to deviate from these guidelines, so it is always the engineer's responsibility to determine the exact locations.

### 6.2 Loop Placement and Application

At most signals, 2 types of loops are used. Presence loops (type "F") and advance loops (type "A" or "B"). The presence loops are used to detect vehicles at the stop bars. Advance loops are used to detect vehicles approaching the intersection. Each of these three types are detailed in Standard Index 17781, but are modified as described below.

For most intersections, type "F" presence loops should be 6' x 40' and placed so that they extend 5' in front of the stop bar. This will sometimes need to be adjusted to minimize false calls from side street driveways or to keep out of the pedestrian crosswalk. Under certain circumstances, it may be necessary to extend the loop as much as 20 feet ahead of the stop bar, especially where right turning vehicles are likely to stop ahead of the stop bar. The presence loops are usually installed on the mainline left turn lanes and on all approach lanes for the side street. Detection is not needed in a right turn lane on the mainline if that movement is programmed to utilize minimum recall or CNA (Call to Non-Actuated).

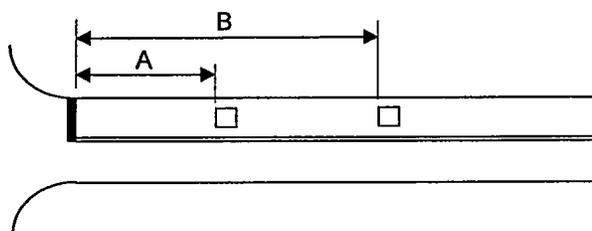
Since some of the vehicular movements can be made without receiving a dedicated phase, delay detectors are used. These movements are generally the side street right turn (which can be made on red) and the mainline left turn (when protected-permitted phasing is used). Additionally, it is sometimes desirable to delay a loop due to other movements (usually left turns) that may cross over it. For each of these loops, specify a delay detector and state that the delay shall be set to 5 seconds. Local agencies may adjust later.

After the loops are placed on the signal plan, careful consideration should be given to the route used to connect the loop to the cabinet. Since off-tracking vehicles routinely damage the pavement edges at the radii, saw-cuts should not terminate within a radius. Also, with milling and resurfacing projects occurring routinely on our major roadways, no side street loops should have saw-cuts leading out into the mainline. This may require the designer to route the saw-cut from the back of the loop to a tangent edge of the side street roadway.

Advance loops are used in conjunction with extension times to serve 2 purposes. First, if a vehicle is waiting on the side street, the loops detect approaching vehicles on the mainline so that the controller can extend the green long enough for the vehicle to clear the intersection (as long as the maximum green has not been reached). Second, by allowing higher speed vehicles to pass through the intersection, the number of motorists

forced to make stop or go decisions is decreased. These features are intended to improve efficiency and safety at the signalized intersection.

In order for the advance loops to serve their purpose, the loop positions must be relative to the approach speed and coordinated with the extension times. The following figure and chart provide general guidance for advance loop placement and timing development.



| Approach Speed (MPH) | A (ft) | B (ft) | Min. Green (seconds) | Extension (seconds) |
|----------------------|--------|--------|----------------------|---------------------|
| 30                   | 100    | n/a    | 13                   | 3.5                 |
| 35                   | 135    | n/a    | 14                   | 3.5                 |
| 40                   | 170    | n/a    | 16                   | 3.5                 |
| 45                   | 150    | 330    | 15                   | 3.0                 |
| 50                   | 160    | 360    | 16                   | 3.0                 |
| 55                   | 180    | 390    | 17                   | 3.0                 |

During the design process, the engineer will need to determine if type “A” or type “B” loops will be used for advance detection. Usually, this is dependant upon the maintaining agencies desire for the subject intersection. Type “A” loops follow the Standard Index except that they are turned 90° so that they can span multiple approach lanes. Type “B” loops strictly follow the Standard Index with 1 loop per lane for each set of advance loops.

If type “B” loops are used and the cabinet has system panels, then the loops should be terminated to the system panel and wired to function as both advance loops and system loops. If installing a new cabinet, this should be specified as a note. For an existing cabinet, this work may require a cabinet modification to complete the wiring properly.

According to specifications, all twisted pair loop wires must be terminated at the controller or at a splice point within 75 feet of the loop. Each spliced loop will have a separate lead-in cable from the splice point to the controller cabinet. When possible, the lead-in cable should be run through conduit from the loop to the controller. With urban typicals with tight right of way and/or a lot of utilities it may be necessary to saw-cut the lead-in cable back to the cabinet. Once the loop locations are determined and placed on the plan, the loops should be labeled. Each loop should be numbered to match the corresponding movement number.

**6.3 Video Detection**

If the designer is required to use video detection, careful consideration should be given as to where the cameras are positioned in the intersection. It is important that cameras do not detect cross-traffic through the intersection or could potentially become blocked by other stopped or turning vehicles (primarily large trucks).

District Five preference for video detection coverage is similar for loop detection regarding mainline left turn lanes and side streets. A 6-foot by 40-foot rectangle should be shown and consideration should be given to a larger area based on engineering judgment. Advance detection should be shown as a large area that extends from the stop bar to the first set of advance loops and the extension time should be reduced (i.e. 0.5 seconds).

The designer should coordinate with the maintaining agency to ensure the detection zones are shown properly and the signal timing chart complies with the agency's preferences.

## 7.0 CONDUIT AND JUNCTION BOXES/PULL BOXES

### 7.1 Introduction

This section is intended to give guidance to reflect the District 5 preferences for the installation of conduit as well as pull and junction boxes. This information is in addition to the specific information referred to in sections 630 and 635 of the Standard Specifications for Road and Bridge Construction.

### 7.2 Conduit

Conduit is generally installed in one of these 4 methods, above ground, underground, under pavement, and with a jack and bore machine / direction bore. For each of these methods, follow the guidance provided in the Standard Index and in the specifications.

Some general methods of payment have become standard in District 5. For example, when multiple conduits are run together across pavement, only 1 conduit should be paid for with the underpavement or jack & bore pay item number. The additional conduits shall be paid for with the underground pay item number. For jack & bore, this is limited to 4 conduits. Beyond 4, an additional jack & bore conduit will be required.

When pay item 630-1-14 is used, include the following note in the General Notes Sheet:  
*"The contractor has the option to use directional bore as the conduit installation method for pay item 630-1-14."*

Other information regarding conduit installations that should also be noted:

- The designer should note that the directional bore equipment must be positioned in an area approximately 15' behind the beginning of the bore. In many space restrictive intersections, this will impact the conduit routing.

### 7.3 Pull and Junction Boxes

Pull and Junction Boxes are used to provide access for installing cables during construction and for maintenance of cables and splices during the life of the signal or the signalization equipment.

When placing pull boxes, the designer shall make sure that these minimum requirements are met:

- Do not place in areas where they will be driven over such as dirt driveways or behind unprotected radii (where off-tracking vehicles could destroy).
- Place in relatively dry areas.
- Place at least 10 ft from pavement edge without curb.

## 10.0 TRAFFIC SIGNAL COMMUNICATIONS

### 10.1 General Requirements

Traffic signals are coordinated through various communication methods. When modifications to existing systems are required, the coordination method must be addressed in the plans. There are 3 basic types of work that require such modifications. They are: (1) modifying the cabinet of a signal that is currently coordinated, (2) installing a new signal within or near a coordinated section, and (3) installing a new signal within a ½ mile of another signal along a corridor.

When coordination installations or modifications are required, a few basic decisions must be made to determine how the signals will communicate. If a physical connection is made between the intersections, the designer must determine the type of connection and whether the cable is to be run overhead or underground.

#### Overhead

For overhead cable routes, existing utility poles are generally used. The cable is attached at a certain height that is agreed upon by the utility pole owner. This height generally is a certain distance away from an existing utility already mounted to the poles or from the ground to the proposed attachment point. The designer must ensure that proper roadway clearances are met for driveways and side streets if the cable is to be mounted to the utility poles. The plans should show the poles that are to be attached to and how the cable is to be installed from controller to controller. The designer may also need to include cable guys for turns and terminations of the cable.

Prior to finalizing the cable mounting locations, a maintenance agreement between the cable owner and the pole owner is usually required. Contact the pole owner for further details and requirements. Since the maintenance agreements usually require the cable owner to pay unknown amounts at unspecified times, the Department is not able to sign such agreements. In these circumstances, contact the maintaining agency to request their assistance.

#### Underground

For underground installations, conduit and pull boxes are required. With these designs, the designer must ensure that the maximum pull box spacing is met, that all driveways and other obstacles are included in the design, and that the proper type of cable and pull boxes are used.

For either type of installation, the cable must be run into the controller cabinet. For existing cabinets, the designer should pay close attention to the number of spare conduits entering the cabinet. If no spares are available, an alternative entry method must be specified.

Both types of installations also require slack cable at periodic points along the cable run. For overhead installations, an extra 200' of cable should be available at controller cabinets or wound around a 'sno-shoe', with spacing every ¼ to ½ mile. For underground

installations, "special" round pull boxes  (635-1-16) are to be used at the controller cabinets with 200 feet of slack. Fiber optic pull boxes  (635-1-15) are used at intermediate locations with 100 feet of slack. If the "special" round pull boxes will not fit at the cabinet location, then the fiber optic boxes can be substituted in their place with 100 feet of slack. The "special" round pull boxes should also be used at full median openings where a signal is possible in the future. Either type can be spaced up to a 1/4 mile, depending on the typical section and utilities. In urban areas, for example, this maximum spacing may need to be reduced. Fiber is to be 12 multi-mode/24 single-mode for signals. Utilize 12 strand cable into the cabinet with 25 feet of slack (minimum) in the adjacent pull box.

When modifying an existing communication link, the designer must carefully examine the existing cable routing. Even if an existing interconnect cable is passing by the proposed traffic signal, it may not be possible to connect directly to it. For example, if there is not enough slack in the cable, it may not physically be possible to route the existing cable through the cabinet. In situations like these, it is usually necessary to cut the cable and run a new cable to an adjacent traffic signal or splice point.

#### **10.2 Time Based Coordination**

Throughout many of the coordinated systems, no direct communications exist between the controller cabinets. To coordinate the traffic movements, the controllers may utilize Time Based Coordination (TBC). While this is perhaps the cheapest way to build a system, TBC requires periodic resetting of the clocks at each of the controllers to ensure proper coordination. If the determination has been made that no new cables are to be installed, only system timing adjustments are required to accommodate signal modifications within a TBC system.

#### **10.3 Hardwire**

The hardwire system behaves similarly to the TBC system except that there are copper conductors wired between the controllers. Electrical pulses sent through these conductors by the master controller communicate information such as the current time and when the controllers should switch from 1 timing plan to another. When making modifications to an existing hardwire cable, splices are generally allowed as long as they are enclosed in an adequately insulated enclosure.

#### **10.4 Closed Loop**

The closed loop system allows a broader range of communication between traffic signals. Through the use of modems and telephone lines, the controllers are able to pass along information such as timing plans and stored traffic counts. These systems can be accessed from the office through the use of a computer with a modem and a standard phone line. Modifications to these systems should be coordinated directly with the maintaining agency to determine all of the implications the proposed modifications will produce.

### **10.5 Central Control Systems**

Central control systems utilize fiber optic cables to provide communication capabilities that are far greater than the need of traffic signals. Often times, these cables not only allow the signal controllers to communicate, but also allow other uses of the spare fibers (i.e., ITS components). For this reason, it is important for the designer to realize that modifications to the existing fiber optic cables may impact more than the traffic signals. Usually, the maintaining agency can provide further information for specific fiber lines.

When making modifications to cabinets with new or existing fiber optic cables, appropriate end equipment must be used. The fiber should be properly terminated at the cabinets rather than coiled on the floor of the cabinet. In order for this to occur properly, the designer should state in the plans the equipment that is to be installed what the individual fibers are to be connected to.

To specify the fiber connections, a fiber splice diagram should be included in the signal plans for each termination point. Prior to developing the splice diagrams, the maintaining agency and the Traffic Operations Office should be consulted to determine what is currently being used. For new installations, standard buffer assignments should be used.

Rather than terminating every fiber in each cabinet, only the fibers required for the cabinet should be connected to the fiber trunk line. This connection should be made through the use of a buried or aerial splice enclosure with drop fibers run to the cabinet.

## **13.0 PERMITS**

### **13.1 Introduction**

Prior to beginning any construction activities within state right of way, a permit must be acquired. This section provides simple guidance for working with the Traffic Operations Office to coordinate the signalization portion of the permit. For detailed permit information, contact the local FDOT Maintenance Office.

### **13.2 Signal Warrants**

Before a signal is built or an additional phase is added/modified, a study must determine that the signal is needed and is in the best interest of the motoring public. This study should then be submitted for review and approval by the DTOE prior to submittal of signal plans. For detailed information on signal warrants, see the MUTCD and the Florida Manual on Uniform Traffic Studies (MUTS).

### **13.3 Signal Plans**

In general, once signalization plans have been developed and are ready for permit submittal, they should first be delivered to the local FDOT Maintenance Office. There, the engineer can obtain the necessary permit application forms to begin the permit review process. The Maintenance Office will assign a permit number and then forward the plans to the Traffic Operations Office.

Initial comments from Traffic Operations will be sent directly to the Engineer developing the signal plans. The plans should then be revised as necessary and returned directly to Traffic Operations with the permit number clearly identified within the submitted plans package and written responses to the previous comments. Coordination with the maintaining agency needs to be made also, and any comments that they have should also be forwarded to Traffic Operations for informational purposes. If the intersection modifications are minor (such as installing loops only), then once all of the comments made by the Traffic Operations staff have been properly addressed, the plans package will be returned to the local Maintenance Office with recommendation for signal plan approval. The Local Maintenance Office will issue the permit once all of their requirements have been satisfied, which may include driveway comments or other issues not related to Traffic Operations.

If the permit involves the installation of either strain poles or mast arms, then additional information will be requested in the initial review of the plans. This will include a Geotechnical Report (for mast arms) or an ATLAS report (for strain poles). Traffic Operations will coordinate the review of this information with our Geotech and Structural Groups. Once all of their issues have been satisfactorily addressed, the plans package will be returned to the local Maintenance Office with recommendation for signal plan approval.

The following is a basic list of the items that will be required throughout the signal permit approval process:

- Signed and Sealed Copies of the Final Plan (7 Copies)
- Striping & Signalization CADD Files (.dxf or .dgn format)
- Signed and sealed ATLAS Calculations (Strain Poles)
- Signed and Sealed Geotech Report (Mast Arms)
- Special Conditions Supplement (Mast Arms Only)
- Submittal Data (1 copy approved by the EOR)
- Quality Control Plan (Mast Arms Only)
- Drilled Shaft Installation Plan (Mast Arms Only)
- Shop Drawings Stamped by the Structural Engineer of Record and the Contractor (Non Standard Mast Arms Only)
- Class IV Concrete Mix Design (Mast Arms Only)
- Copy of the Warranty Bond

If the installation is a mast arm, the permittee must have the shaft installation inspected and documented by a Qualified Drilled Shaft Inspector. After the drilled shaft installation/inspection is complete, the PE, in responsible charge of the drilled shaft inspector, must review the inspection documentation and provide a signed and sealed final Drilled Shaft Inspection Report.

#### **13.4 Permit plans submitted by Public Agencies**

Public agency permittees follow the same process as the private permittees except that only the first 5 items listed above in 13.3, will be required prior to permit approval. After the contractor is selected, the remaining items must be submitted and approved prior to the beginning of construction. When a public agency is only doing work that involves a signal modification (no roadway work), the approval for the work will be done through a Letter of Authorization issued by Traffic Operations rather than a permit.

Revised 1/29/08

## **REVISIONS**

The following is a summary of significant revisions that were made to previous iterations of the Signalization Guidelines:

### **1/29/2008**

- Section 3.1 – Revised signal head placement to far side of intersection.
- Section 3.2 – Added paragraph discussing box-span guidance.
- Section 3.2 – Revised 3-section and 5-section signal head height.
- Section 3.2 – Provided guidance on two-point connection and sag % for ATLAS.
- Section 3.3 – Added ½ -inch cable diameter.
- Section 4.4.4 – Additional 3-section head to outside right turn lane.
- Section 4.7 – Revised pedestrian detector signs per Design Standards.
- Section 4.8 – Add backplates to all signal heads.
- Section 5.1 – Removed 75-foot text.
- Section 5.5 – Removed “Caution, Caution, Caution” panel.
- Section 6.3 – Added section regarding video detection.
- Section 7.2 – Added 630-1-14 note.
- Section 11.3 – GPS preemption to be coordinated with the maintaining agency.

## 5. CONSTRUCTABILITY REVIEWS

### 5.1. CONSTRUCTABILITY REVIEW PROCESS

In District 5, "Constructability" will have two phases:

1. QC: Actual constructability review performed utilizing CPAM constructability checklist. On **Consultant Designed Projects**, the consultant team will have responsibility for performing these reviews. On the **In-House Designed Projects** (and selected consultant designed projects), the D5 Construction Office will utilize its constructability contract to perform these reviews. In either case, the person performing the constructability QC review must have actual road/bridge building experience.

2. QA: Review to insure the QC (constructability) review is performed and that the designer properly resolves valid issues. The Resident Office staff that will oversee the construction (Project Manager or Project Administrator) will perform this review. Another function of this review is to look at known problem areas (utilizing "Constructability HOT LIST") and impart Department experience to avoid repeated problems.

#### 3. General Comments

- District and Resident offices should review the "Constructability Hot List" on a bi-annual basis to determine if items should be added or deleted from the "Hot List".
- PREFERENCES need to be expressed to designer early on. The FDOT construction team member needs to attend all design team meetings and communicate preferences as early as possible in the design process.
- During QA review, comments should be limited to problems that affect constructability and claims avoidance. "Can it be built the way the plans show?" should be asked before the comment is written down.
- If the QA reviewer has an irresistible urge to comment on a preference, or a mistake is noted that may not impact constructability, the QA reviewer can add a "BTWCHN" (By the way, couldn't help noticing) category of comments.

#### Extinguish the Torch

The "Extinguish the Torch" is a meeting with Department Personnel, Consultants and when appropriate, the Contractor at around the 90% completion of the project, to review project issues, along with project challenges and successes.

This meeting is intended to supplement the current District Five practice of Design Team meetings. It is hoped that we could learn from what went right, what went wrong, maybe

even see where specific decisions made during project development and design had a direct impact with the final time and cost overruns on project.  
More information about Extinguish the Torch at D5 Construction website.

**5. CONSTRUCTABILITY REVIEWS**

**5.2. HOT LIST**

**Quantities / Pay Items:**

- \_\_\_\_\_ Verify – Lump Sum Pay Items should not have quantities anywhere in the plans, Except: Bridges: concrete quantities, steel and final striping.
- \_\_\_\_\_ Check all plan notes & verify compensation is properly defined for required work.
- \_\_\_\_\_ Be sure there are pay items, or notes explaining how the work is going to be paid.

**Pavement**

- \_\_\_\_\_ Review each proposed typical section on milling/resurfacing projects with Resident Bituminous Specialist to ensure that the required correction and construction quantity are provided, so that the designed cross slope or cross slope correction can be built in compliance with the specifications.
- \_\_\_\_\_ On very busy intersections, do you want to recommend black base in lieu of lime rock to minimize traffic impact?
- \_\_\_\_\_ There should be only one milling control point per typical section. That milling control point should not be variable, or include terms such as MINIMUM or MAXIMUM.

**Traffic Control Plan (TCP):**

**CONSTRUCTION REVIEW OF  
TRAFFIC CONTROL PLANS**

Financial Project ID No.: \_\_\_\_\_ Road No.: \_\_\_\_\_

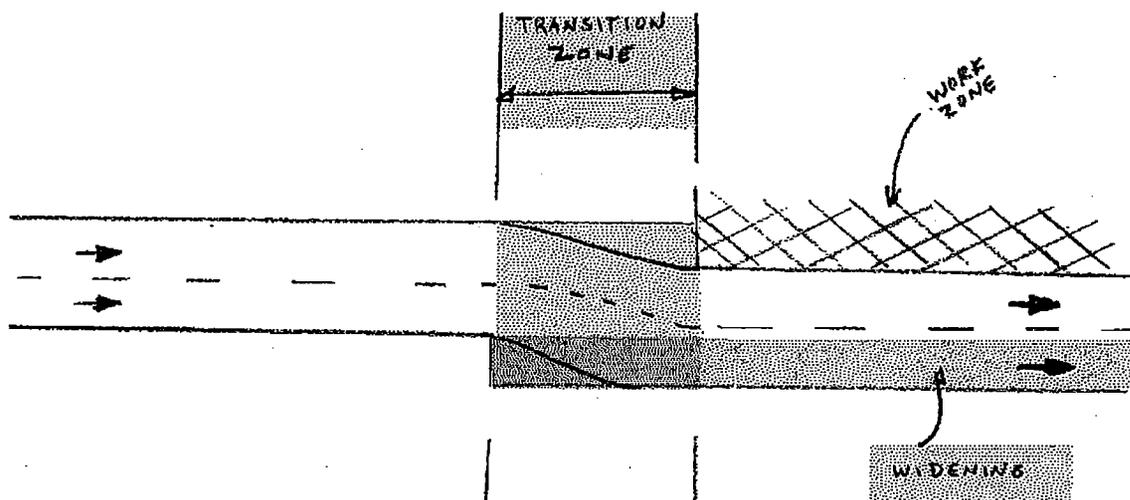
Name of Reviewer: \_\_\_\_\_ Signature: \_\_\_\_\_

Resident Engineer: \_\_\_\_\_ Signature: \_\_\_\_\_

| Item No. | Feature to be Checked   | Ok | Not Ok | N/A |
|----------|---|----|--------|-----|
| 1.       | Insure the TCP provides sufficient information and detail to construct through intersections, transitions, and major driveways. Make sure necessary detours / diversions are included in the TCP. |    |        |     |
| 2.       | Review the TCP for elevation differences between phases and existing roadway (ex: business entrances / driveways / intersections).  |    |        |     |
| 3.       | Review TCP and make sure clear zone is addressed on any temporary pavement (poles, mailboxes, etc.)   |    |        |     |

|     |   |  |  |  |
|-----|---|--|--|--|
| 4.  | Review detour plans to assure semi trucks and large vehicles (trailers) can maneuver through the route and access driveways and side streets.   |  |  |  |
| 5.  | Specific directions should be given in the TCP on temporary signal alignment and timing. There should be no general notes putting the responsibility onto the contractor.   |  |  |  |
| 6.  | Does MOT plans show enough detail?  |  |  |  |
| 7.  | Removable pavement markings must be included for bridges projects.  |  |  |  |
| 8.  | Temporary Signal timing should be included in the plans.  |  |  |  |
| 9.  | On non-interstate reconstruction / widening projects, the designer should not include permanent speed limit signs.  |  |  |  |
| 10. | Adequate accommodations for intersecting and crossing traffic.  |  |  |  |
| 11. | Address pedestrian and bicycle accommodations.  |  |  |  |
| 12. | Are exits and entrances to the work zone adequate and safe?   |  |  |  |
| 13. | Review lane closure restrictions with special emphasis on the following: <ul style="list-style-type: none"> <li>• Lane Closure Window <ul style="list-style-type: none"> <li>○ Can the window be expanded?</li> <li>○ Are there viable alternate routes to allow the expansion of traffic window?</li> <li>○ AM / PM rush hour direction.</li> </ul> </li> <li>• Multi-Lane Facilities (Stage Lane Closure)</li> <li>• Local Events</li> <li>• Local knowledge/history of traffic conditions</li> </ul> |  |  |  |
| 14. | Does the TCP call for milling/overlay or thin asphalt overlay in traffic "transition" zones?  |  |  |  |

(A transition zone is an area where vehicles are being directed to travel on existing or widened pavement nonparallel to the existing pavement markings, and are being directed "across" obliterated markings.)



**Drainage:**

- \_\_\_\_\_ Review the TCP with temporary drainage in mind. Look at the TCP cross-sections to see if we're trapping water. If a temporary drainage system is needed, provide a detailed plan, notes alone are insufficient.
- \_\_\_\_\_ When flexible pipe is specified or given as an option: make sure there is enough cover.
- \_\_\_\_\_ Review that size of drainage is correct.
- \_\_\_\_\_ Check for conflicts between drainage and remaining structures.
- \_\_\_\_\_ Lateral Ditches: When R/W constraints allow, the design width of the ditch bottom should be greater than 6 feet to allow the use of a bulldozer.

**Utilities:**

- \_\_\_\_\_ Go to the field and review the plans for possible utility conflicts. In particular: strain poles / mast arms / sign foundations.
- \_\_\_\_\_ Are utilities too close to sub grade?
- \_\_\_\_\_ Review JPA plans against TCP phasing.

**Earthwork:**

- \_\_\_\_\_ Check that soil borings are deeper than any planned construction (ponds, drainage structures, sheet piles, utilities & foundations etc.)
- \_\_\_\_\_ Be sure subsoil excavation is shown in cross sections.

**Structures:**

- \_\_\_\_\_ Check that any special details are constructible, tolerances are achievable in the field.
- \_\_\_\_\_ Sheet Piles: Are they constructible? Is overhead clear of utilities?
- \_\_\_\_\_ Were there borings performed along the alignment of the sheet piles? Were the borings deeper than the bottom of the sheet pile?
- \_\_\_\_\_ Do the approach slabs to bridge match the road profile?
- \_\_\_\_\_ If structure over water: Are temporary navigation lights or construction signs for boaters?
- \_\_\_\_\_ Are there construction signs on boat ramps?
- \_\_\_\_\_ Are there provision for pedestrians (walk ways/bikes)
- \_\_\_\_\_ Is there access for machinery?
- \_\_\_\_\_ When constructing bridges, machinery will probably damage the pavement of the road underneath. Plans should address repaving underneath bridges.

**Maintenance Issues:**

- \_\_\_\_\_ Will you use sod to prevent erosion?
- \_\_\_\_\_ Make sure that the mowing quantities are in line with the job. The designers have been using a 2' sod strip calculated for the length of the project because we are adding 2' of sod. In reality when we mow, we have to mow the entire area and have a considerable overrun in quantity. The designers are aware but may not catch the old jobs pulled off the shelves.
- \_\_\_\_\_ When new shoulders are being constructed, consider adding a note or specification that requires the contractor to remove the material and dispose of it without damaging the existing stand of grass that is outside the limits of new sod.

- \_\_\_\_\_ When plans calls for abutting properties with the same sod, be sure there is a pay item for that kind of sod.
- \_\_\_\_\_ Pond fencing needs to be coordinated with Local municipalities prior to final plans.

4. Constructability QA Guidelist

- \_\_\_\_\_ Review CPAM Checklist from previous phase (QC Review). Determine if the designer addressed valid concerns. Depending on the size & nature of the project, and the extent of QC comments, the QA reviewer may opt to “chase out” selected comments that have the highest potential for problems in the field.
- \_\_\_\_\_ Review the need for on-duty / off-duty officers at 60%. If it is determined that on-duty officers are needed on non-interstate projects, the recommendation needs to be forwarded from the Resident Office to the District Construction Engineer.

## **6. DESIGN EXPECTATIONS (COMING ATTRACTIONS)**

- 6.1 Focus on Project Constraints
- 6.2 Focus on construction Estimates
- 6.3 Focus on Stakeholder Involvement