Addendum #1

SR 400 (I-4) Interchange at SR 46

Seminole County

Financial Projects Number(s): 407573-1-52-01

Federal Aid Project Number(s): 0042-248-I

Contract Number: E5N96

January 24, 2011

The Request for Proposal for the above referenced project is amended as follows:

1. Page 5 of 70, Section E to read:

E. Question and Answer Session

The Department may meet with each Proposer, formally, for a Question and Answer session**.** FHWA shall be invited on FA Oversight Projects. The purpose of the Q & A session is for the Technical Review Committee to seek clarification and ask questions, as it relates to the Technical Proposal, of the Proposer. The Question and Answer sessions will occur a after the date the Technical Proposal are due, and be part of the Overall Technical Proposal Scoring. The Proposers shall be given a minimum of one (1) week after the Question and Answer session to submit their Price Proposal. The Department will terminate the presentations promptly at the end of the allotted time. The Department may tape record or videotape all or part of the presentations. The Question and Answer session will not constitute "discussions" or negotiations. Proposers will not be permitted to ask questions of the Department except to ask the meaning of a clarification question posed by the Department. Within one (1) week of the Q&A session, the Design-Build Firm shall submit to the Department a written clarification letter summarizing the clarifications provided during the Q&A session. No additional time will be allowed to research answers.

2. Page 43 of 70, Section E. Drainage Analysis, Addition of:

If a drainage structure must be installed inside the volume of an MSE wall, and if pipe connected to that drainage structure must pass through or under the MSE wall, the structure must extend to the flow line of the deepest pipe; vertical pipes will not be permitted on this project.

3. Attachments, Right of Way Agreements and Stipulation. Agreement for parcel 800 is amended.

4. Other Documents. List of contacted utilities is added.

5. Other Documents. Florida Public Utilities As-Built plans and AT&T mark-ups are added.

6. Attachments, Striping Design Guidelines and Signal Design Guidelines are added.

IN THE CIRCUIT COURT OF THE EIGHTEENTH JUDICIAL CIRCUIT IN AND FOR SEMINOLE COUNTY, FLORIDA

CIVIL ACTION NO.: 08-CA-6563-13-W

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION,

Petitioner,

vs.

Parcel Nos.: 800

FIRST TEAM FORD, LTD., et al.

Respondents.

_____/

STIPULATED AMENDED ORDER OF TAKING
NUNC PRO TUNC AS TO PARCEL NO. 800

THIS CAUSE came on for consideration by the Court upon the Stipulation and Joint Motion of Petitioner, **STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION,** (hereinafter "FDOT"), and Respondent, **FIRST TEAM FORD, LTD., a Florida limited partnership** for entry of this Stipulated Amended Order of Taking Nunc Pro Tunc as to Parcel No. 800 for the purpose of describing with specifically the scope and use of the easement designated as Parcel No. 800, and it appearing to the Court that the parties were authorized to enter into such motion and the Court finding that the taking is necessary for a public purpose and it appearing that proper notice was given to all owners and to all persons having or claiming any equity, lien, title or other interest in or to the real property described in Exhibit "A" attached hereto, which was acquired by Petitioner by Stipulated Order of Taking previously entered by this Court on January 5, 2009, and which title vested in the Petitioner on January 15, 2009:

WHEREUPON IT IS ORDERED AND ADJUDGED AS FOLLOWS:

1. This Court has jurisdiction of the subject matter and the parties to this cause.

2. The pleadings in this cause are sufficient and the Petitioner is properly exercising its delegated authority.

3. The taking of Parcel No. 800 is necessary for a proper public purpose.

4. The Declaration of Taking filed in this cause by the Petitioner is a good faith estimate of value and based upon a valid appraisal.

5. Title to the Parcel 800 previously vested in the Petitioner on January 15, 2009 pursuant to the Stipulated Order of Taking, dated January 5, 2009, and Petitioner's deposit of its good faith estimate of value into the Registry of the Court.

6. The Stipulated Order of Taking requires the parties to submit an amended Order of Taking that amends the legal description for Parcel No. 800 to describe with specificity the scope and use of Parcel No. 800. The area described in the legal description for Parcel No. 800 by metes and bounds is not being amended, revised or altered as a result of the amendment.

7. FDOT will construct the Project in substantial conformance to the construction plans which were admitted into evidence at the Order of Taking Hearing on January 5, 2009.

8. The legal description of Parcel No. 800, attached as Exhibit A to the Stipulated Order of Taking dated January 5, 2009 is hereby amended to describe with specificity the scope and use of Parcel No. 800 Part A and Part B, including to provide what said Parcel may be used for and may not be used for, during, and after construction of the subject project as set forth in the attached Exhibit "A".

9. This Stipulated Amended Order of Taking Nunc Pro Tunc as to Parcel No. 800 shall have no effect on the Stipulated Order of Taking with regard to Parcel 102. The Stipulated Order of

Taking as it related to Parcel 102 remains in full force and effect without amendment or modification.

IT IS HEREBY ORDERED that the Court's Stipulated Order of Taking entered on January 5, 2009 is hereby amended, with respect to Parcel 800 only, to reflect the scope and use of Parcel No. 800 as set forth on the attached Exhibit "A".

ORDERED AND ADJUDGED this document shall serve as a Right of Entry for Florida Department of Transportation to enter / cross the subject premises remainder under reasonable circumstances with reasonable notice to clear the Parcel No. 800 (removal of light posts, parking bumpers, non-security fence, well, irrigation and bollards) through a route to be reasonably indicated by Respondent, FIRST TEAM FORD, LTD. if Respondent, FIRST TEAM FORD, LTD. elects not to remove said improvements (by first removing the improvements themselves, within thirty days after the date of deposit); and it is further

ORDERED AND ADJUDGED that the Court reserves jurisdiction to enforce the terms of this Stipulated Amended Order of Taking Nunc Pro Tunc as to Parcel No. 800.

DONE AND ORDERED, Seminole County, Florida this ____ day of JAN 1 3 2011, 2011.

Alan Dickey
Circuit Judge

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that a copy of the foregoing Stipulated Amended Order of Taking Nunc Pro Tunc as to Parcel No. 800 has been furnished by U.S. Mail this ____ day of JAN 1 3 2011, 2011 to:

Clifford R. Saulter, Esquire, State of Florida, Department of Transportation, 719 South Woodland Blvd., DeLand, Florida 32720.

Bradley S. Gould, Esquire, Holland & Knight, 701 Brickell Avenue, Suite 3000, Miami, Florida 33131.

Susan Dietrich, Esquire, Seminole County Services Building, 1101 East First Street, Sanford, Florida 32771.

Debbie Whitehead

Judicial Assistant / ~~Attorney~~

F.P.No. 407573 1 SECTION 77160 S.R. 400 SEMINOLE CO. DESCRIPTION

PERPETUAL WALL MAINTENANCE EASEMENT & PERPETUAL HARMONIZING EASEMENT

PARCEL 800

THAT PART OF:

"The North 15 acres of the Northeast 1/4 of the Southwest 1/4 of all of the Southeast 1/4 of the Northwest 1/4 of road (Less Right-Of-Way for Road), Section 29, Township 19 South, Range 30 East, described as follows:

Begin at the Southwest corner of the Southeast 1/4 of the Northwest 1/4 of Section 29, Township 19 South, Range 30 East, Seminole County, Florida and run N 00°21'43" W along the West line of the Southeast 1/4 of the Northwest 1/4 of said Section 29, for a distance of 345.02 feet to a point on the Southerly Right-Of-Way line of Wayside Drive (Old State Road 46); thence run N 47°52'41" E along said Right-of-Way line for a distance of 530.67 feet to the point of curvature of a curve concave Southeasterly having a radius of 1382.39 feet and a central angle of 10°41'58"; thence run Northeasterly along the arc of said curve and said Right-of-Way line for a distance of 258.15 feet to a point of non-tangency; thence run S 85°06'19" E for a distance of 38.45 feet; thence run S 32°58'28" E for a distance of 147.48 feet to a point on the South line of lands described in Official Records Book 1172, Page 956, of the Public Records of Seminole County, Florida; thence run N 68°33'31" E along said line for a distance of 299.15 feet; thence run N 00°11'15" W for a distance of 98.23 feet; thence run S 86°20'41" E for a distance of 40.56 feet; thence run S 59°56'29" E for a distance of 95.00 feet to a point on the aforesaid South line of Official Records Book 1172, Page 956; thence run N 68°33'31" E along said line for a distance of 180.00 feet to a point on the Westerly Right-of-Way line of State Road 400 (Interstate 4), a limited access highway; thence run Southerly along the Westerly Right-of-Way line of said State Road 400 as follows: S 00°13'15" E, 325.12 feet; S 10°13';36" W, 224.49 feet; S 23°53'14" W, 948.09 feet to a point on the Northerly Right-of-Way line of Woodruff Springs Road, according to the Plat thereof, as recorded in Plat Book 8, Page 23, of the Public Records of Seminole County, Florida; thence run S 89°49'07" W along said Northerly Right-of-Way line 861.97 feet to a point on the West line of the Northeast 1/4 of the Southwest 1/4 of said Section 29; thence run N 00°02'48" W along said West line 464.19 feet to the POINT OF BEGINNING."

(The above described parcel of land being the lands described and recorded in Official Records Book 4332, Page 1290, Public Records of Seminole County, Florida.)

PART A - PERPETUAL WALL MAINTENANCE EASEMENT

BEING DESCRIBED AS FOLLOWS:

PERPETUAL WALL MAINTENANCE EASEMENT & PERPETUAL HARMONIZING EASEMENT

PARCEL 800 (cont'd)

Commence at a 1/2" Iron Rod (No ID), located at the Northeast corner of the Northwest 1/4 of Section 29, Township 19 South, Range 30 East, Seminole County, Florida; thence run South 00°05'25" East, along the East line of said Northwest 1/4, a distance of 1529.79 feet to the Centerline of Survey of State Road 46, as shown on the Florida Department of Transportation Right of Way Map, F.P. No. 407573-1, Section 77160 on file at the Florida Department of Transportation District Five Office, Surveying and Mapping Section, Deland, Florida; thence departing the East line of the Northwest 1/4 of said Section 29, run South 89°58'02" West, along said Centerline of Survey, a distance of 25.00 feet; thence departing said Centerline of Survey, run South 00°05'25" East, a distance of 100.00 feet to the point of intersection of the South existing right of way line of said State Road 46 and the West existing limited access right of way line of the aforementioned right of way map; thence continue South 00°05'25" East, along said West existing limited access right of way line, a distance of 335.39 feet for a POINT OF BEGINNING; thence continue South 00°05'25" East, along said West existing limited access right of way line, a distance of 33.43 feet; thence departing said West existing limited access right of way line, run South 22°19'45" West, a distance of 730.78 feet to the point of curvature of a curve, concave Northwesterly, having a radius of 7629.19 feet, a chord bearing of South 24°04'21" West and a chord distance of 464.18 feet; thence run Southwesterly along the arc of said curve, through a central angle of 03°29'11.6", a distance of 464.25 feet to the North existing right of way line of Woodruff Springs Road, according to the plat thereof, as recorded in Plat Book 8, Page 23, Public Records of Seminole County, Florida; thence departing said curve, run South 89°56'01" West, along said North existing right of way line, a distance of 16.68 feet to a point on a non-tangent curve, concave Northwesterly, having a radius of 7614.19 feet, a chord bearing of North 24°06'00" East and a chord distance of 470.54 feet; thence departing said North existing right of way line, run Northeasterly along the arc of said curve, from a Tangent Bearing of South 25°52'14" West, through a central angle of 03°32'29", a distance of 470.62 feet to the point of tangency; thence run North 22°19'45" East, a distance of 627.37 feet; thence run North 16°53'10" East, a distance of 57.87 feet; thence run North 28°05'27" East, a distance of 77.10 feet to the POINT OF BEGINNING.

(Containing 18,522 square feet, more or less.)

Parcel No. 800 Part A (Perpetual Wall Maintenance Easement) is a perpetual easement for use and benefit of the Petitioner and its assigns, any such assignment cannot be contrary to Section 73.013, Florida Statutes or Florida law, for the purpose of clearing, excavating, constructing, operating, and maintaining a barrier/retaining wall located on Parcel No. 102 for I-4, with all such fills, cuts, drains, ditches and other incidents which the Petitioner may deem necessary or convenient in connection therewith, in, over, under, upon and through the lands described above. To the extent that Petitioner uses the Perpetual Wall Maintenance Easement after the proposed construction depicted on the construction plans is completed,

PERPETUAL WALL MAINTENANCE EASEMENT & PERPETUAL HARMONIZING EASEMENT

PARCEL 800 (cont'd)

Petitioner shall restore the area within the Perpetual Wall Maintenance Easement to its condition prior to Petitioner's use. Respondents, its successors and assigns may not construct, improve or plant, except for grass or sod, within the Perpetual Wall Maintenance Easement anything that obstructs Petitioner's maintenance of the barrier/retaining wall located on Parcel No. 102 for I-4 or impedes access by Petitioner's construction and/or maintenance vehicles to the barrier/retaining wall located on Parcel No. 102 for I-4. The Respondent, its successors or assigns are also prohibited from installing utilities or other improvements within the Permanent Wall Maintenance Easement, except upon written permission granted by Petitioner. The Respondent, its successors and assigns are prohibited from using the Perpetual Wall Maintenance Easement area for any purpose inconsistent with the Petitioner's use of its easement for purposes stated herein.

PART B - HARMONIZING EASEMENT

BEING DESCRIBED AS FOLLOWS:

Commence at a 1/2" Iron Rod (No ID), located at the Northeast corner of the Northwest 1/4 of Section 29, Township 19 South, Range 30 East, Seminole County, Florida; thence run South 00°05'25" East, along the East line of said Northwest 1/4, a distance of 1529.79 feet to the Centerline of Survey of State Road 46, as shown on the Florida Department of Transportation Right of Way Map, F.P. No. 407573-1, Section 77160 on file at the Florida Department of Transportation District Five Office, Surveying and Mapping Section, Deland, Florida; thence departing the East line of the Northwest 1/4 of said Section 29, run South 89°58'02" West, along said Centerline of Survey, a distance of 25.00 feet; thence departing said Centerline of Survey, run South 00°05'25" East, a distance of 100.00 feet to the point of intersection of the South existing right of way line of said State Road 46 and the West existing limited access right of way line of State Road 400 (Interstate 4), as shown on the aforementioned right of way map; thence continue South 00°05'25" East, along said West existing limited access right of way line, a distance of 335.39 feet; thence departing said West existing limited access right of way line, run South 28°05'27" West, a distance of 77.10 feet; thence run South 16°53'10" West, a distance of 57.87 feet; thence run South 22°19'45" West, a distance of 87.84 feet for a POINT OF BEGINNING; thence continue South 22°19'45" West, a distance of 166.25 feet; thence run North 67°40'15" West, a distance of 50.00 feet; thence run North 22°19'45" East, a distance of 166.25 feet; thence run South 67°40'15" East, a distance of 50.00 feet to the POINT OF BEGINNING.

(Containing: 8312 square feet, more or less.)

Containing in Aggregate: 0.616 Acres, more or less.

PERPETUAL WALL MAINTENANCE EASEMENT & PERPETUAL HARMONIZING EASEMENT

PARCEL 800 (cont'd)

Parcel No. 800 Part B (Perpetual Harmonizing Easement) is a perpetual easement for use and benefit of the Petitioner and its assigns, any such assignment cannot be contrary to Section 73.013, Florida Statutes or Florida law, for the limited purpose of harmonizing the ground surface of the area within this easement with the construction proposed under the above-referenced project. Petitioner's harmonizing shall consist of excavation or placement of fill dirt, and the maintenance thereof, over, upon, under and across the lands described above. Petitioner shall obtain all necessary permits to modify the retention pond from the applicable permitting authorities.

Reserving unto the Respondent all incidents, benefits and rights of ownership not detrimental to adjacent Petitioner property or improvements and reserving unto Respondent the right to remove any and all fill dirt placed in the easement area by Petitioner or to replace dirt excavated from the easement area by Petitioner pursuant to this agreement. Prior to removing or replacing fill dirt in the easement area, Respondent shall provide to the Maintenance Engineer for Petitioner's Local Maintenance Unit construction plans for said work for Petitioner's review and approval. Petitioner's review of the plans shall be limited to insuring that proposed work is not detrimental to the adjacent Petitioner property or improvements and Petitioner's approval shall not be unreasonably withheld.

IN THE CIRCUIT COURT OF THE EIGHTEENTH JUDICIAL CIRCUIT IN AND FOR SEMINOLE COUNTY, FLORIDA

CIVIL ACTION NO.: 08-CA-6563-13-W

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION,

Petitioner,

vs.

Parcel Nos.: 102, 800

FIRST TEAM FORD, LTD., et al.

Respondents.

_____/

JOINT MOTION

COME NOW the parties to this action, by and through the undersigned and respectfully move this Honorable Court for entry of the foregoing Stipulated Amended Order of Taking Nunc Pro Tunc as to Parcel No. 800 this 11th day of January, 2011.

Clifford R. Saulter, Esquire
State of Florida
Department of Transportation
719 South Woodland Blvd.
Deland, Florida 32720
(386) 943-5490
Florida Bar No.: 25128
Attorney for Petitioner

Bradley S. Gould, Esquire
Holland & Knight, LLP
701 Brickell Avenue, Suite 3000
Miami, Florida 33131
(305) 374-5850
Florida Bar No.: 966150
Attorney for Respondent,
First Team Ford, Ltd.

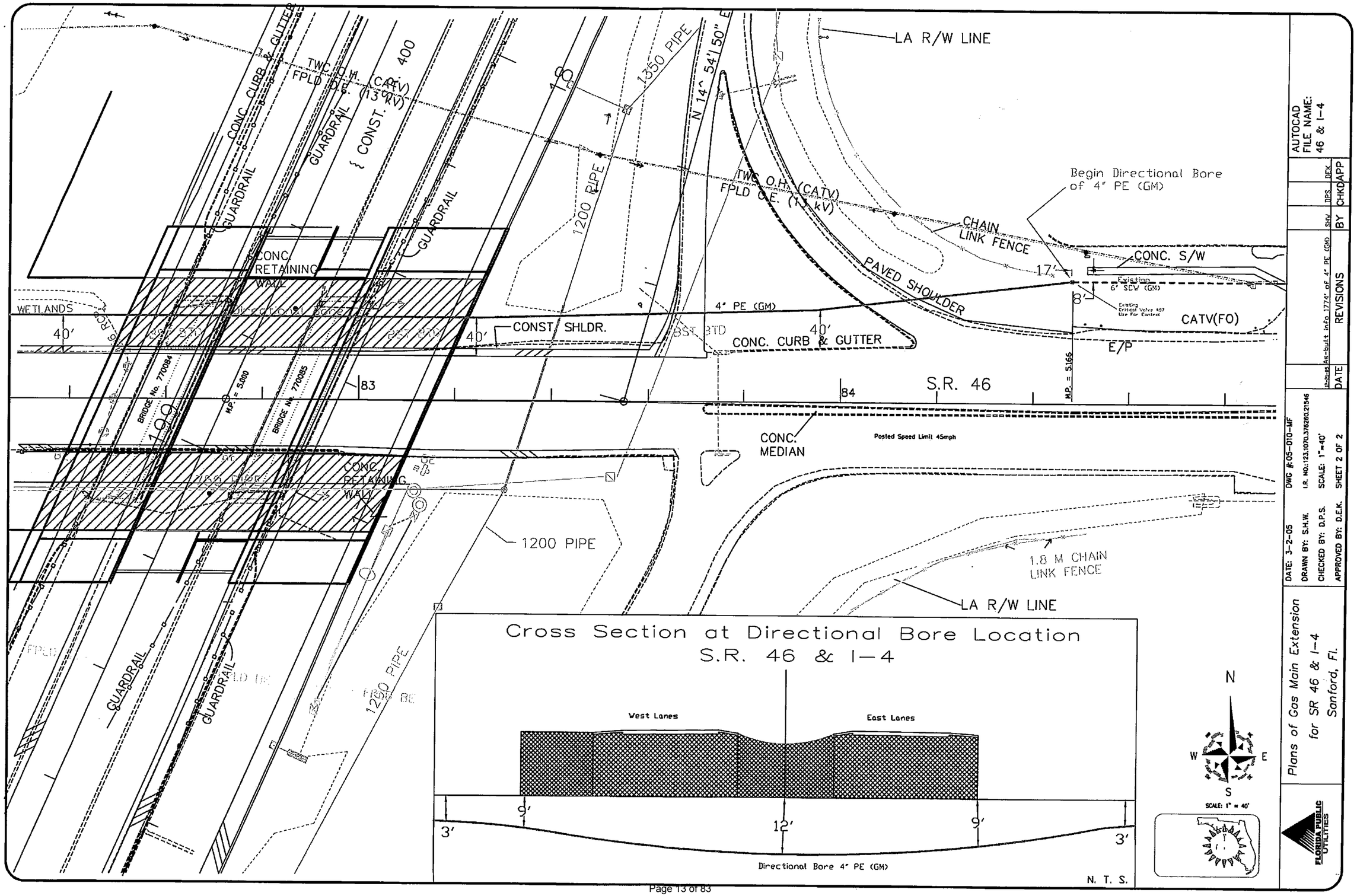
The following is a list of utilities that were contacted:

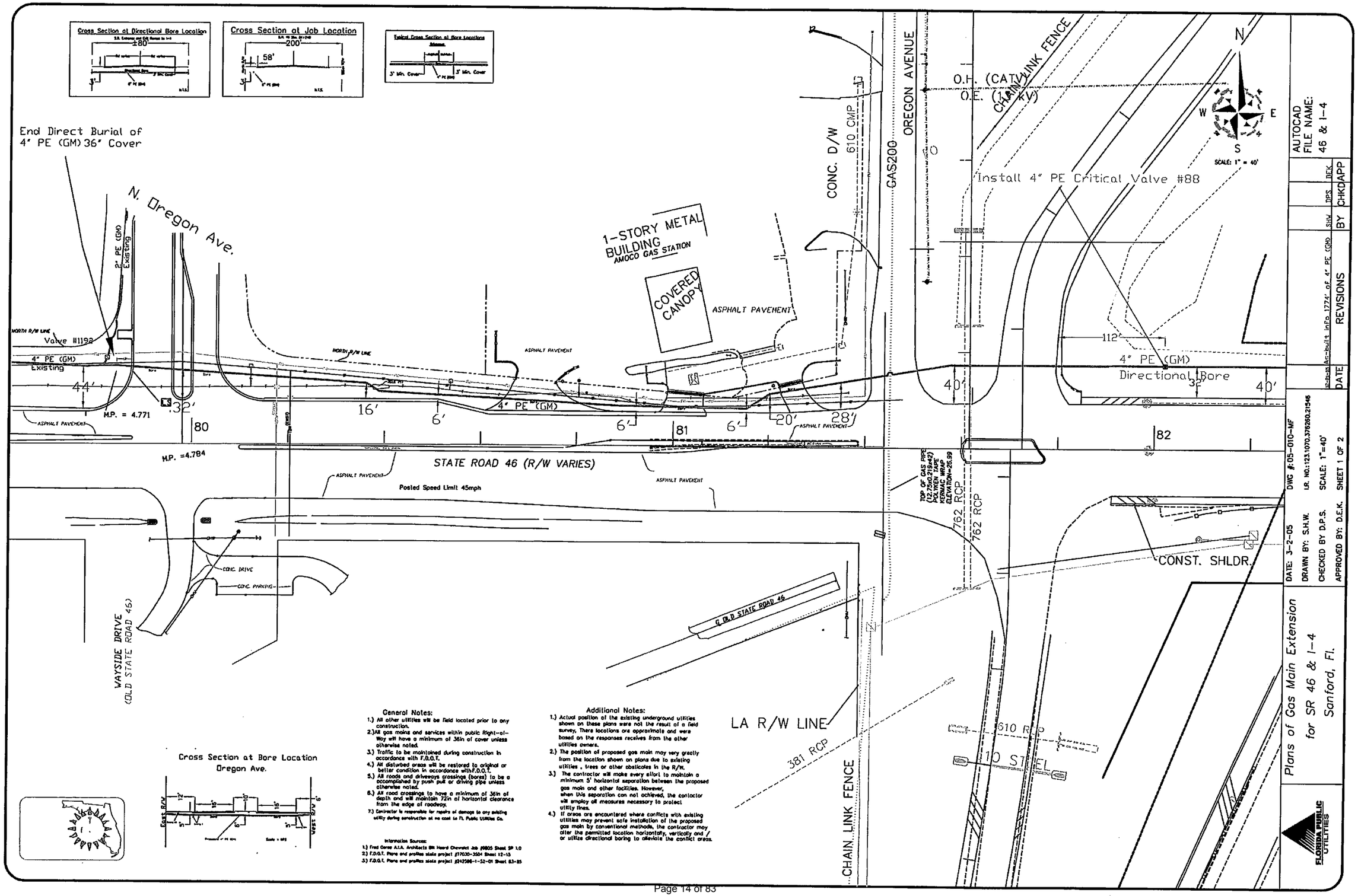
Utility Company	First Name	Last Name	Address	Phone Number	E-mail Address	Red, Greens & Browns Returned (In Other Documents)
AT&T Florida	James	Farrell	450 North Goldenrod Road Orlando, FL 32807	(407) 273-5084	jf6552@att.com	X
BrightHouse Networks	Mark	Mendoza	3767 All American Boulevard Orlando, FL 32810	(407) 532-8519	mark.mendoza@mybrighthouse.com	X
City of Lake Mary	Bruce	Paster	911 Wallace Court Lake Mary, FL 32746	(407) 585-1452	bpaster@lakemaryfl.com	
City of Sanford	Richard	Blake	Post Office Box 1788 Sanford, FL 32773	(407) 688-5106	blakerl@sanfordfl.gov	
ComCast	Liam	McKenna	4305 Vineland Road Suite G-2 Orlando, FL 32811	(407) 849-3610	Liam_McKenna@cable.comcast.com	
Florida Gas Transmission	Joe	Sanchez	2405 Lucien Way Suite 200 Maitland, FL 32751	(407) 838-7171	joseph.e.sanchez@sug.com	X
Florida Power & Light (Distribution)	Johnie	Wilson	P.O. Box 2149 Sanford, FL 32130	(407) 328-1422	j.r.johnie.wilson@fpl.com	X

Florida Power & Light (Transmission)	Craig	Coughlin	700 Universe Boulevard TLE/JB Juno Beach, FL 33408	(561) 694-4751 (561) 603-9381	craig.coughlin@fpl.com	
Florida Public Utilities	Dan	Scribben	450 South Highway 17-92 Debary, FL 32713	(386) 668-9319	dscribben@fpuc.com	X (As-Builts)
Progress Energy (Transmission)	David	Stephens	18115 US Hwy 41 North Suite 100 Lutz, FL 33549	(813) 948-4147 x. 304	dstephens@ucsynergetic.com	X
Seminole County (Environmental)	Dennis	Westrick	500 W. Lake Mary Blvd. Suite 200 Sanford, FL 32773	(407) 665-2040	dwestrick@seminolecountyfl.gov	
Seminole County (Traffic)	Charles	Wetzel	140 Bush Loop Sanford, FL 32773	(407) 665-5686	cwetzel@seminolecountyfl.gov	
TW Telecom	Jim	Sowers	485 North Keller Road Suite 551 Maitland, FL 32751	(407) 215-6895	jim.sowers@twtelecom.com	

The following is a list of utilities that signed the Design Build Utility Agreement:

Not Applicable at this time


LA R/W LINE
CONC. CURB & GUTTER
TWC O.H. (CATV)
FPLD O.H. (CATV) (13 kV)
CONST. 400
GUARDRAIL
1350 PIPE
N 14° 54' 50" E
1200 PIPE
TWC O.H. (CATV)
FPLD O.H. (13 kV)
Begin Directional Bore of 4" PE (GM)
CHAIN LINK FENCE
CONC. S/W
17'
PAVED SHOULDER
Existing 6" SCW (GM)
8'
Existing Critical Valve #87 Use For Control
CATV(FO)
E/P
CONC. RETAINING WALL
WETLANDS
40'
CONST. SHLDR.
4" PE (GM)
BST BTD
CONC. CURB & GUTTER
M.P. = 5.166
83
84
S.R. 46
BRIDGE No. 770084
BRIDGE No. 770085
M.P. = 5.000
CONC. MEDIAN
Posted Speed Limit 45mph
1.8 M CHAIN LINK FENCE
LA R/W LINE
Cross Section at Directional Bore Location
S.R. 46 & I-4
West Lanes
East Lanes
9'
12'
9'
3'
3'
Directional Bore 4" PE (GM)
N. T. S.
N
W
E
S
SCALE: 1" = 40'
AUTOCAD FILE NAME: 46 & I-4
DATE
REVISIONS
BY
CHK
APP
DFK
DPS
SHW
Plans of Gas Main Extension for SR 46 & I-4 Sanford, Fl.
DATE: 3-2-05
DRAWN BY: S.H.W.
CHECKED BY: D.P.S.
APPROVED BY: D.E.K.
DWG #:05-010-MF
I.R. NO.:123.1070.376280.21546
SCALE: 1"=40'
SHEET 2 OF 2
FLORIDA PUBLIC UTILITIES


Cross Section at Directional Bore Location
±80'
Cross Section at Job Location
200'
58'
Typical Cross Section of Bore Locations
3' Min. Cover
3' Min. Cover
End Direct Burial of
4" PE (GM) 36" Cover
N. Oregon Ave.
2" PE (GM)
Existing
NORTH R/W LINE
Valve #11192
4" PE (GM)
Existing
44'
32'
M.P. = 4.771
80
M.P. =4.784
ASPHALT PAVEMENT
16'
6'
4" PE (GM)
6'
81
6'
20'
28'
1-STORY METAL
BUILDING
AMOCO GAS STATION
COVERED
CANOPY
ASPHALT PAVEMENT
CONC. D/W
610 CMP
GAS200
OREGON AVENUE
O.H. (CATV)
O.E. (1 KV)
CHAIN LINK FENCE
Install 4" PE Critical Valve #88
112'
4" PE (GM)
Directional Bore
32'
40'
40'
82
STATE ROAD 46 (R/W VARIES)
Posted Speed Limit 45mph
TOP OF GAS PIPE
(12.75x0.219x42)
POLYKEN TAPE
MEASURED WITH
ELEVATION=25.99
762 RCP
762 RCP
CONST. SHLDR.
CONC. DRIVE
CONC. PARKING
WAYSIDE DRIVE
(OLD STATE ROAD 46)
OLD STATE ROAD 46
LA R/W LINE
381 RCP
CHAIN LINK FENCE
610 RCP
10" STEEL
N
S
E
W
SCALE: 1" = 40'
AUTOCAD
FILE NAME:
46 & I-4
DEK
DPS
SHW
BY
CHKD
APP
REVISIONS
DATE
DWG #:05-010-MF
LR. NO:123.1070.376260.21546
SCALE: 1"=40'
SHEET 1 OF 2
DATE: 3-2-05
DRAWN BY: S.H.W.
CHECKED BY D.P.S.
APPROVED BY: D.E.K.
Plans of Gas Main Extension
for SR 46 & I-4
Sanford, Fl.
FLORIDA PUBLIC UTILITIES
Cross Section at Bore Location
Oregon Ave.
East R/W
West R/W
General Notes:
1.) All other utilities will be field located prior to any construction.
2.) All gas mains and services within public Right-of-Way will have a minimum of 36in of cover unless otherwise noted.
3.) Traffic to be maintained during construction in accordance with F.D.O.T.
4.) All disturbed areas will be restored to original or better condition in accordance with F.D.O.T.
5.) All roads and driveways crossings (bores) to be a accomplished by push pull or driving pipe unless otherwise noted.
6.) All road crossings to have a minimum of 36in of depth and will maintain 72in of horizontal clearance from the edge of roadway.
7.) Contractor is responsible for repairs of damage to any existing utility during construction at no cost to FL Public Utilities Co.
Information Sources:
1.) Fred Carse A.I.A. Architects Bill Heard Chevrolet Job #9805 Sheet SP 1.0
2.) F.D.O.T. Plans and profiles state project #77030-3504 Sheet 12-15
3.) F.D.O.T. Plans and profiles state project #242586-1-52-01 Sheet 83-85
Additional Notes:
1.) Actual position of the existing underground utilities shown on these plans were not the result of a field survey. These locations are approximate and were based on the responses receives from the other utilities owners.
2.) The position of proposed gas main may very greatly from the location shown on plans due to existing utilities, trees or other obsticales in the R/W.
3.) The contractor will make every effort to maintain a minimum 5' horizontal separation between the proposed gas main and other facilities. However, when this separation can not achieved, the contractor will employ all measures necessary to protect utility lines.
4.) If areas are encountered where conflicts with existing utilities may prevent safe installation of the proposed gas main by conventional methods, the contractor may alter the permitted location horizontally, vertically and / or utilize directional boring to alleviate the conflict areas.

Florida Department of Transportation
District 5

Guidelines for Traffic Signal Plan Preparation

Revised 1/10/11

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10.0 TRAFFIC SIGNAL COMMUNICATIONS

10.1 General Requirements

11.0 PREEMPTION

11.1 Introduction

11.2 Railroad Preemption

11.3 Emergency Vehicle Preemption

11.4 Preemption Phase Plan and Timings

12.0 SIGNAL MAINTENANCE OF TRAFFIC DURING CONSTRUCTION

12.1 Introduction

12.2 Disruption of Signal Operation

12.3 Loss of Vehicle Detection

13.0 PERMITS

13.1 Introduction

13.2 Signal Warrants

13.3 Signal Plans

14.0 REFERENCES

14.1 Traffic Signal Design References

14.2 Contacts for Maintaining Agencies

REVISONS

1.0 INTRODUCTION

This document is to be used as a guide for the design and/or upgrade of a traffic signal as well as any traffic signal system equipment that may be required. 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), and the Traffic Engineering Manual as well as current District 5 preferences**. These guidelines address the actual design of a signal installation as well as the format for a signal plans package. In the event of a discrepancy in requirements between these preferences and the aforementioned references, the requirements set forth in this document shall 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 signalization plans. The engineer of record should be fully competent in traffic and signalization design prior to using this information to comply with District 5 preferences. Additional information can be found in ITE's **Manual of Traffic Signal Design** by Kell and Fullerton.

TRAFFIC SIGNAL PLAN PREPARATION

Purpose of this Chapter

Chapter 24, Volume II of the **Plans Preparation Manual** (PPM) addresses how to prepare a Signalization 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, signalization plans are a component set of plans. In some instances, however, it is not always necessary to create a separate set of plans. 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 TRNS*PORT printout is necessary for signalization items.

2.2 Key Sheet

No comments at this time.

2.3 Tabulation of Quantities

No comments at this time.

2.4 General Notes/ Pay Item Notes

It shall be the Designers' responsibility to familiarize themselves with the standard general notes. The general notes will be found in two categories: Standard General Notes for District 5 and Standard General Notes for the Maintaining Agency(s). Only the relevant general notes shall be used and the general notes shall be categorized as follows:

1. General
2. Utilities
3. Controller
4. Pedestrian Features
5. Mast Arms
6. Signal Cable/Loops/Conduit/Pull Boxes
7. Signal Heads
8. Pay Item Notes
9. Signal Structures
10. Communications

Pay Item Notes shall be separated from General Notes and organized by the numerical order of the pay item number.

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

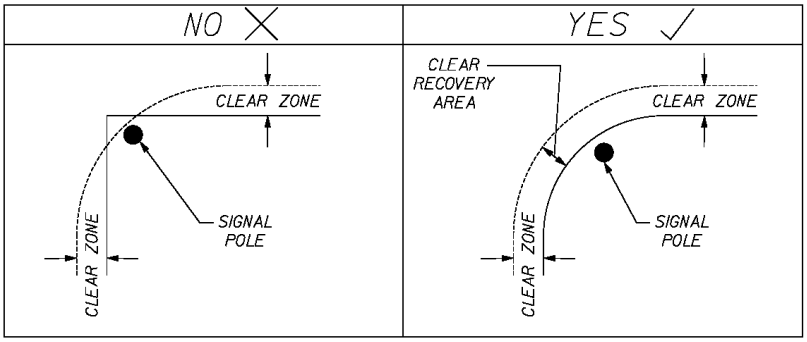
No comments at this time.

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)
  - For urban locations, minimum clear zone (4-feet from face of curb) should only be used if significant design constraints are present. Otherwise, every effort should be made to locate the signal pole as far from the travel way as possible, preferably near the R/W limit.
  - For rural locations, clear zone should be met in the radius return (see diagram below). Clear zone requirements for the approach speeds should be used. A minimum of 15-feet may be permitted if R/W or other design constraints are present.



Other design aspects:

- Positioning of the crosswalks and the pedestrian features (level landing and pedestrian pushbutton location)
- 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 $^{2}/_{3}$ 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 for the pole foundations. Designers should keep in mind the constructability aspects when determining the pole locations, for example a four-foot drilled shaft foundation may require a 55-inch diameter casing to complete the installation. **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 before pursuing any design variations.

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 support wire(s) 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 support wire while 3-section, 5-section head, and 4-section heads hang approximately 4.0 feet to 5.5 feet below the support wire. The minimum vertical clearance shall be calculated so the adjustment can be made without replacing the span wire.

Once the necessary data has been compiled, an approved strain pole design program should be utilized to select and design the pole. Only qualified individuals that are familiar with the intricacies of the approved strain pole design program should design poles. Modification to the input file may 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.

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

When using single-point attachment configurations, separation of the signal heads is important. Six feet minimum separation should be considered to reduce the potential of signal heads colliding during periods of high winds. Eight feet of separation should be provided if 4-section heads are used.

For two-point span wire attachments, a catenary wire sag of 5% (+/- 0.5%) shall be used in the design. For single-point span wire attachments a 3% (+/- 0.5%) sag shall be used.

Although “good soils” are often encountered throughout the District, designers should consider using a “worst-case” soil conditions (i.e. 60 pcf) in the strain pole design program.

The results of the pole designs should be provided in a pole schedule. This schedule should use the variables shown in Figure 3.2.1. The “A” dimension should be the same for each end of the span (for single-point attachments, this value will be zero). The messenger cable should be level across the span; however, if the roadway has elevation differences of several feet between the approaches, a sloped messenger wire may be utilized. The poles should be designed in even foot increments with any extra length added to the “C” dimension. The schedule should also state the type of pole to be used (i.e. Type N-VII or P-VII) and specify the dimensions for other poles such as concrete pedestals for pedestrian features. The designer should aim for an 18 foot clearance above the roadway. When designing a near side signal the designer should also verify the maximum height is met as shown in the 2009 MUTCD, figure 4D-5 on page 465. The distances are to the top of the signal housing.

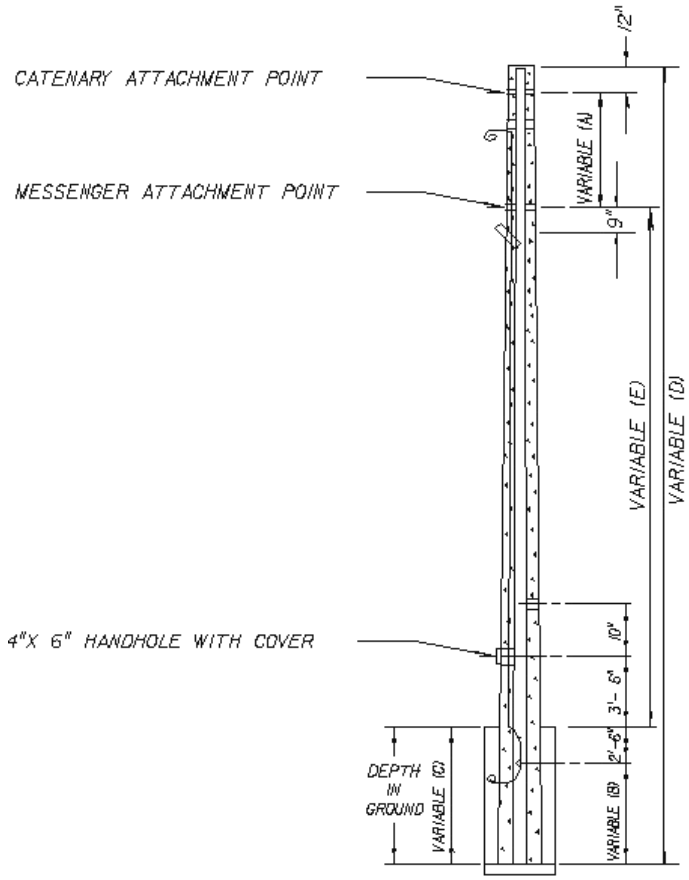


Figure 3.2.1

The cable diameter ($^3/_8$, $^7/_{16}$ or ½ -inch) should also be stated with the pole data for both the messenger and catenary cables. Note that ¼ inch cable should not be used. If the ATLAS output specifies ¼ inch cable, verify that the span was designed for $^3/_8$ inch and specify $^3/_8$-inch cable for use instead.

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.

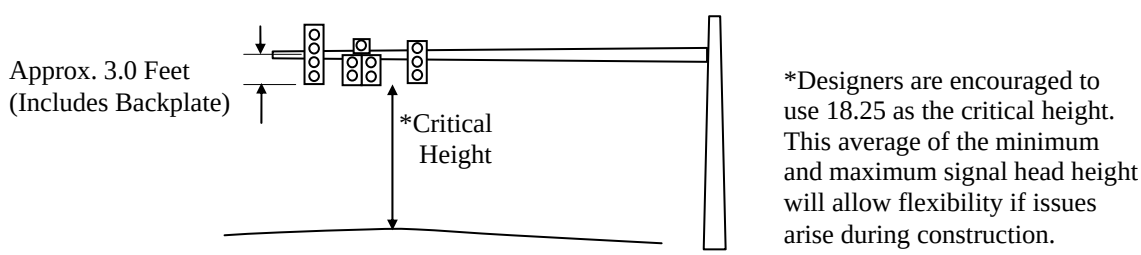


Figure 3.4.1

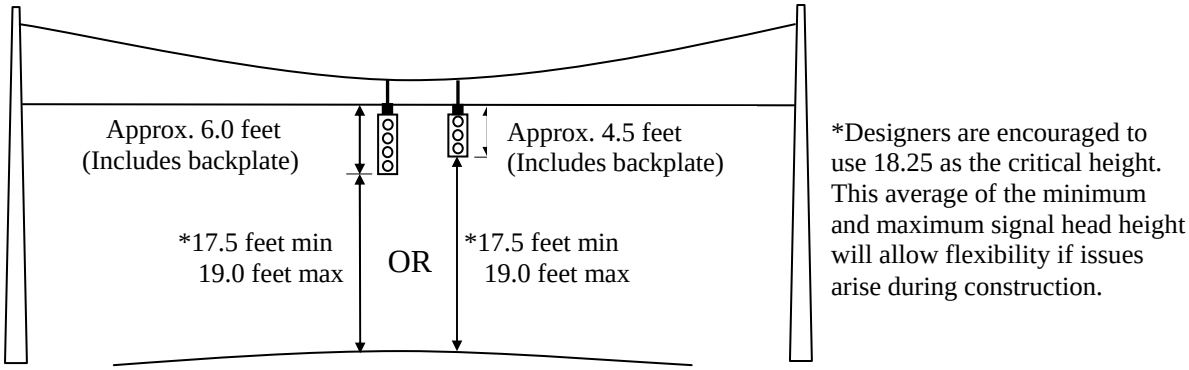


Figure 3.4.2

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. The maximum acceptable length of an arm is 78 feet. If longer arms are required, a meeting with Traffic Operations and Structures design shall be required. Detailed instructions on pole and arm selections are included in the Standards and PPM. 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.

Galvanized finish should be provided for mast arms in District 5. If the local maintaining agency wants "painted" mast arms, then they will have to pay for the additional cost and commit to cover the maintenance cost.

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 and identify other

constructability issues, such as identifying a specific side of the transformer pole that the new service conductor must be placed on.

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.

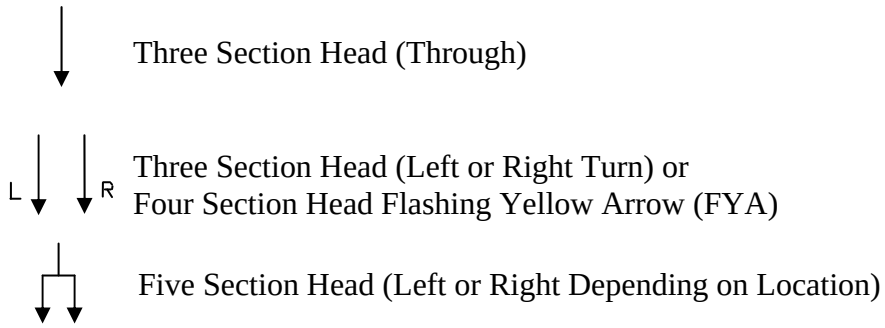
4.0 SIGNAL HEAD PLACEMENT

4.1 Introduction

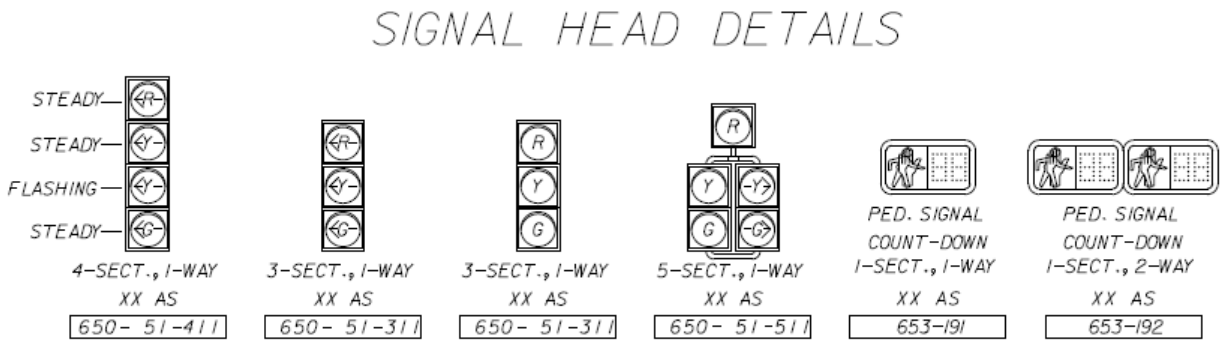
The basic rules governing the requirements regarding overhead signal indications can be found in the **Manual on Uniform Traffic Control Devices** (MUTCD). The minimum requirements stated in the MUTCD should always be adhered to.

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.

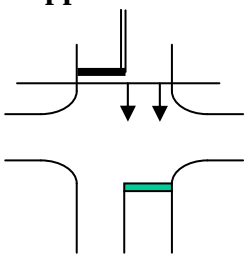


4.3 Traffic Signal Head Placement for "Plus" Intersections

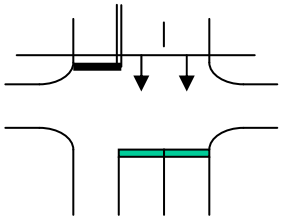
This section provides guidance for signal head placement at typical "plus" intersections. These figures represent District 5 preferences under normal conditions. For many

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.

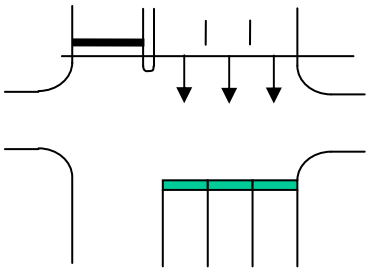
4.3.1 Approach without Turn Lanes - Not Split Phased



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

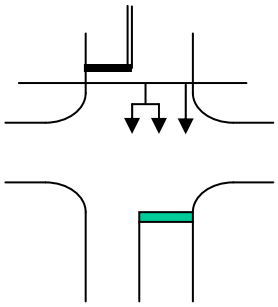


Two Through Lanes
Signal heads to be centered over each lane.

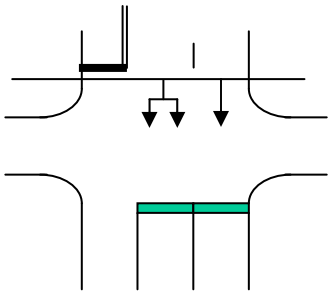


Three Through Lanes
Signal heads centered over lanes.

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

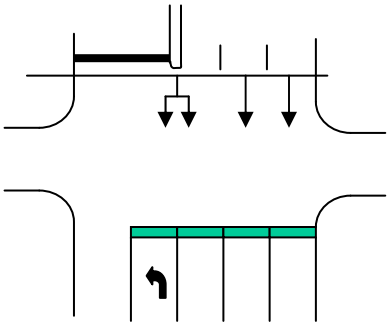


Single Through Lane
Signal heads to be aligned between the lane line and the edge line.



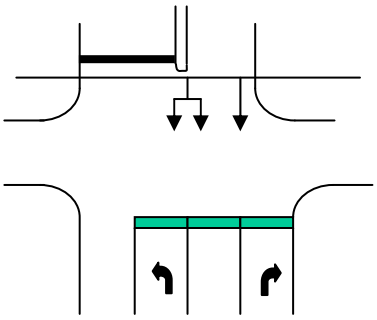
Two Through Lanes
Signal heads to be centered over each lane.

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

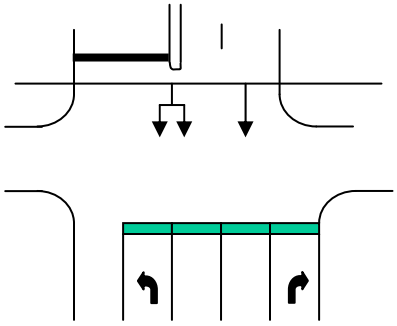


Three Through Lanes
5 Section to be centered over the lane line. 3 Sections to be centered over outside through lanes.

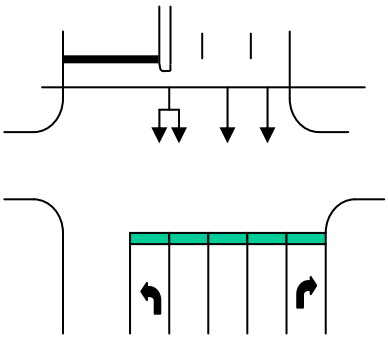
4.3.4 Two Turn Lanes (Left & Right) – Protected/Permitted or Split Phased



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

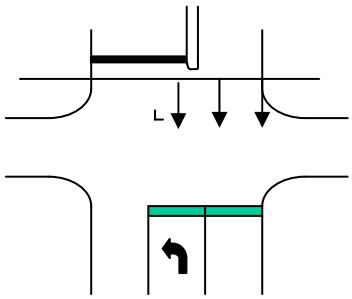


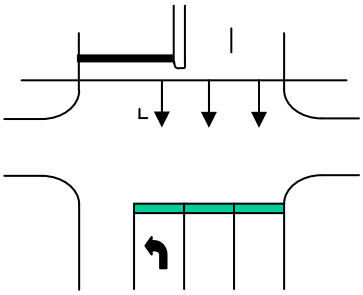
Two Through Lanes
5 Section to be centered over the lane line. 3 Section to be centered over the outside through lane.



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

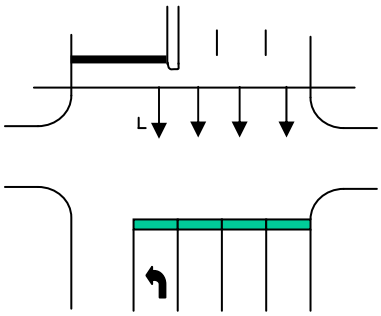
4.3.5 One Left Turn Lane – Protected/FYA/ Not Split Phased





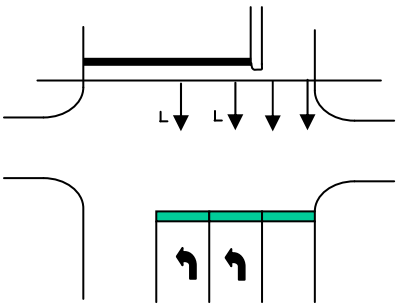
Single Through Lane
3 Section (left) or 4 Section (left) to be over the turn lane. 3 Section (throughs) to be over the through lane.

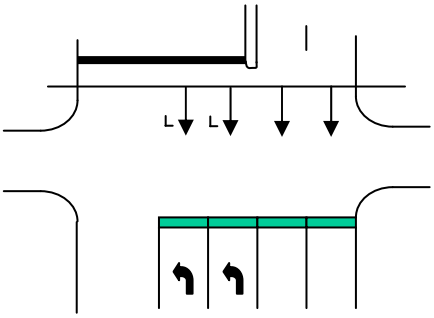
Two Through Lanes
All heads to be centered over their respective lanes.



Three Through Lanes
All signal heads to be centered over their respective lanes.

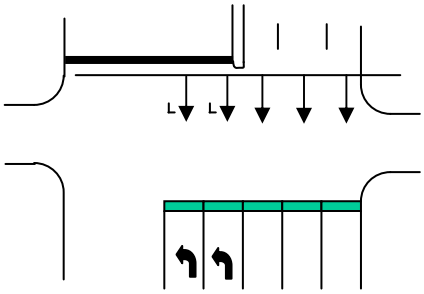
4.3.6 Dual Left Turn Lanes – Protected or Split Phased





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.



<u>Three Through Lanes</u>
All signal heads to be centered over their respective lanes.

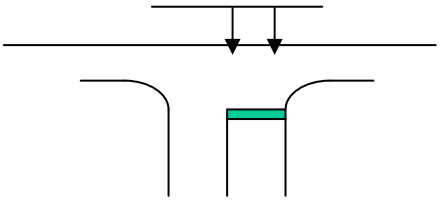
4.3.7 Dual Left Turn Lanes and a Right Turn Lane – Protected or Split Phased

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 signalized 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

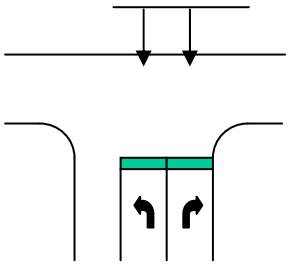
This section provides guidance for signal head placement at typical "T" intersections. These figures represent District 5 preferences under normal conditions. For many applications, the designer will utilize one or more of the figures shown to determine the appropriate placement for a specific intersection.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

4.4.1 Single Lane Approach



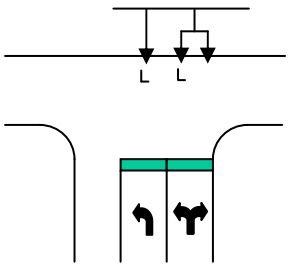
<u>Single Approach Lane</u>
Signal heads to be aligned between the lane line and the edge line.

4.4.2 Two Lane Approach



<u>Two Approach Lanes</u>
Signal heads to be centered over each lane.

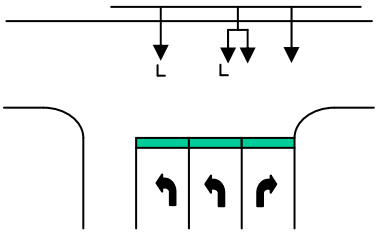
4.4.3 One Designated and One Shared Turn Lane



<u>Two Approach Lanes</u>
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.

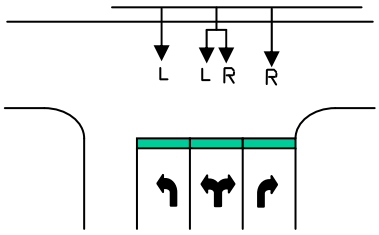
4.4.4 Dual Turn Lanes and a Single Turn Lane



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)

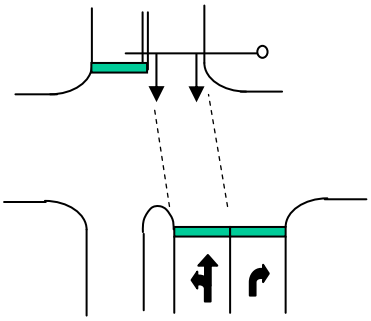


Figure 4.6.1

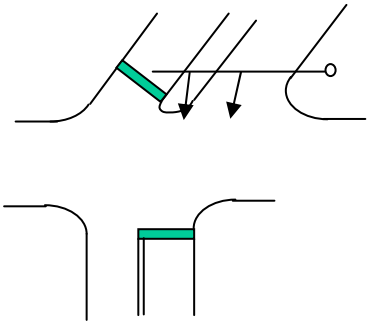


Figure 4.6.2

- 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.

4.7 Pedestrian Signal Head Placement

The placement of pedestrian signals is an important step in the design process. Often times, a carefully laid out signal design that is coordinated with the sidewalk design can utilize signal poles for pedestrian detectors and signals. However, the designer should not assume that this is always the appropriate location for the pedestrian features.

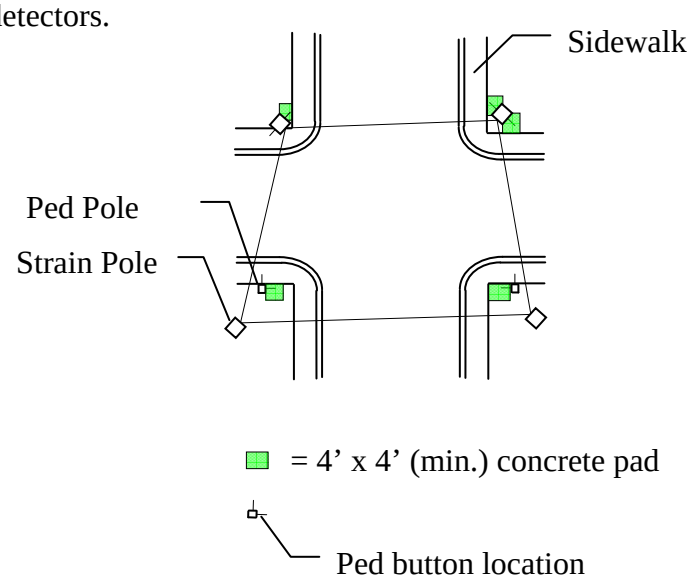
The proposed location of the pedestrian signals should:

- Be visible from the opposite side of the crosswalk even when large trucks are stopped at the stop bar.
- Be relatively close to the crosswalk alignment so that it is clear to the pedestrian that the signal is to be utilized with that crosswalk.
- Be in a location that is not blocked by street name signs or other obstacles (temporary or permanent). For instance, some business owners routinely place displays out near the street corner.

Always keep in mind the accessibility of pedestrians reaching the detectors. All designs should meet the standards from the Americans with Disabilities Act (ADA). Additionally, there should be at least a 4-foot x 4-foot flat, paved sidewalk area adjacent the pole/pedestal for a wheelchair to be positioned directly in front of the detector. It should not be assumed that the pedestrian could reach around the side of the pole to utilize the detector. The pavement around the detector (minimum 4-foot square) must not have a slope greater than 2%. Since each pedestal will have an adjacent pull box, care should be taken to ensure that the pull box would not interfere with the wheelchair access.

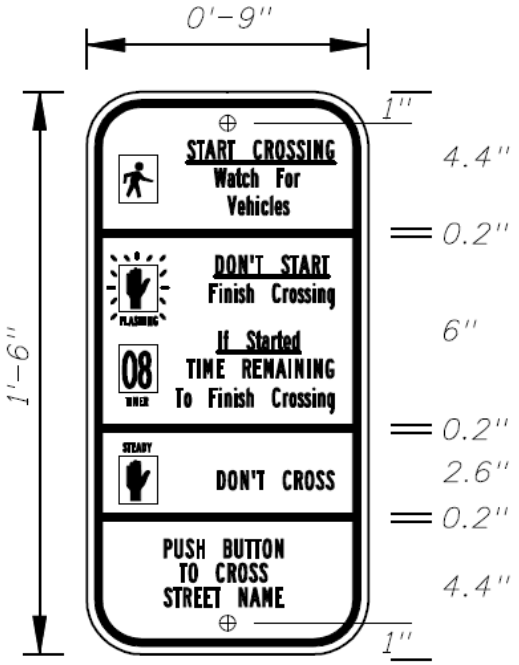
If it is necessary to place a pedestal for pedestrian features within a “free right” island, the pole should be constructed with a frangible base whenever possible. Therefore, the designer should not place concrete poles within such islands.

The intersection below shows 4 different pedestrian configurations. The shaded areas show concrete areas that were added to the original sidewalk to ensure adequate access to the pedestrian detectors.



Note that the pedestrian features mounted to the strain poles (or mast arms) are mounted to the sides of the poles. This forces the contractor to use one-way pedestrian signals even when 2 signals are mounted to the same pole. When pedestals are used, however, the contractor will use a 2-way fixture that is mounted to the top of the pole. The designer should be careful to specify the correct pay item number to avoid conflicts during construction.

Regardless of where the pedestrian signals are located, instructions must be provided at each pedestrian detector location. This information is provided through the use of signs (see below). By a general note, these signs are generally included in the cost of the pedestrian detector.



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4.7 Audible Pedestrian Features

The placement of audible pedestrian features is critical. The designer shall place the detectors a minimum of 10 feet apart. If a 10-foot spacing is not feasible, the design should meet criteria outlined in the 2009 MUTCD, Section 4E.10.

4.8 Backplates

Backplates shall be provided for all signal heads on each approach to improve conspicuousness.

4.9 Line of Sight (Bridges & SPUIs)

Line of sight to the signal heads is important in all signal designs. When calculating sight distance, driver eye-level should be reviewed for both passenger vehicles (3.5 feet) and large trucks (8-feet).

Special design consideration should be given to signal heads hindered by bridge decks. The engineer should explore the use of horizontal heads to improve sight distance. Another acceptable practice is to design the heads so they are 6 inches above the lowest bridge section. This may result in a vertical distance less than 17.5 feet; however, vehicles that are able to pass under the bridge should not run the risk of hitting the signal heads. A Vertical Clearance Design Variation will be required for signal heads that are designed below the 17.5 foot minimum. Refer to the Plan Preparation Manual for information regarding variance submittals.

After the options listed above have been incorporated and sight distance is still a concern, other supplemental signal head options can be explored.

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 and right turn lanes unless other specific reasons require them.
- Crosswalks at signalized intersections should utilize the “special emphasis” type markings.
- 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 likely new crosswalks in urban areas) 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" and "One Ways" 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. 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 shall be 24 inches tall by 48 or 72 inches wide when two attachment points are possible.

When feasible, street block numbering should be considered for each street name sign. This numbering should be coordinated with the local agencies before implementing in the plan designs.

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-inch upper and 6-inch lower case letters in the E-modified font for street name. Below the name, 6-inch 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 Changeable Messages

When adding a new signal, consideration should be given to providing a changeable (variable) message sign 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 sign should be removed.

Message Example

(Panel 1)	(Panel 2)
NEW	**NEW**
SIGNAL	**SIGNAL**
AHEAD	**AHEAD**

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

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-feet x 40-feet and placed so that they extend 5 feet 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).

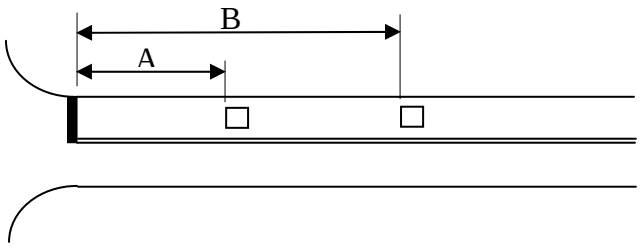
Since some of the vehicular movements can be made without receiving a dedicated phase, delay detectors are used. These movements are generally the side street right turn (which can be made on red) and the mainline left turn (when protected-permitted phasing is used). Additionally, it is sometimes desirable 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 two 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.

Mounting hardware for the detection system shall not be attached to the poles by steel banding/straps or by drilling through the pole. Proper mounting hardware should include a mounting bracket that properly fits around the pole or mast arm. Cameras should not b positioned adjacent to energize power lines or other features that will interfere with detection.

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 feet behind the beginning of the bore. In many space restrictive intersections, this will impact the conduit routing.
- A separate conduit should be provided when using video detection.
- A spare conduit should be provided with each directional bore at the intersection to accommodate future improvements.

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.
- Out of sidewalk or pedestrian ramp.

To facilitate future expansion of intersections, District Five has created a standard pull box configuration to be used at each controller cabinet. Each cabinet shall have 3 pull boxes in line, adjacent to the cabinet. The 3 boxes will be designated for communications, loops, and signal cable (one for each, see Figure 7.3.1). The middle pull box should be designated for loops and all of the pull boxes are to be surrounded by concrete (4" min. thickness, 12" min. around pull boxes) which is to be included in the cost of the cabinet base (in rural areas where grass is maintained by FDOT – consult Traffic Ops regarding need for concrete). For projects where the base already exists, the concrete should be paid for separately.

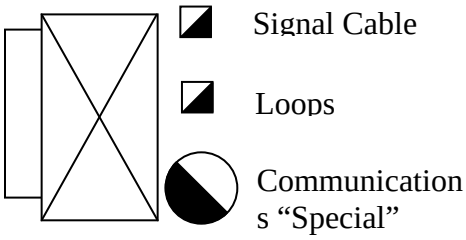


Figure 7.3.1

The communications pull box should be a "special" pull box (635-1-16) in those areas where fiber exists or will be added in the near future. Consideration should be given to placing a "special" pull box (635-1-16) in locations that a future signal may be warranted (generally full median openings). When utilizing the different kinds of fiber optic pull boxes, the Tabulation of Quantities line for this pay item number should separate out the "special" pull boxes (635-1-16) from the fiber optics pull boxes (635-1-15).

8.0 CONTROLLER SELECTION AND PHASING

8.1 Type of Controller

The maintaining agency should be contacted early in the design process to determine what their specific preferences are for the specific location. Generally, agencies have specific brands of equipment that they use for signalization and communication. The proposed controller will need to be compatible with the agency's system.

8.2 Type of Operation

Controller cabinet assemblies can be purchased with a wide range of potential capabilities. For each project location, the goal should be to provide a controller cabinet assembly that will have the potential to serve the intersection's needs throughout the expected life of the controller cabinet assembly. This will require determining the existing phasing and making educated guesses at the future phasing needs for the intersection. Consideration should also be given to preemption requirements such as train, emergency vehicle, and/or bus preemption, as well as future communication needs. It should be noted that many maintaining agencies require a SOP 10 controller assembly even for intersections not currently using all of the available phases.

8.3 Phasing to Reduce Delay

Modifications to signal phasing can have major impacts to the overall efficiency and safety of an intersection. For this reason, all phasing changes (including preemption) to a traffic signal controlling a state roadway must be preapproved in writing by the District Traffic Operations Engineer (DTOE).

Although often requested, left turn phases should not be added to an intersection without the approval of the DTOE. In order to receive this approval, at a minimum, a Left Turn Phase Warrant will need to be provided to the DTOE (with a movement diagram and movement numbers) for approval. This warrant should not be considered an automatic approval, however, as other factors must also be taken into consideration.

In coordinated signal systems, modification to the phasing sequence can sometimes result in reductions in motorist delay. An example of this modification is changing the protected only left turn phases to a lead-lag configuration. These types of modifications should be proposed in an engineering study and approved by the DTOE prior to implementation.

Intersections where side street movements operate separately are known as split-phased intersections. This phasing configuration is common throughout Florida and District 5. In many locations this phasing configuration is used where the intersecting side streets are offset from one another such that vehicular conflicts between opposing vehicles would result if they operated concurrently. Often split phasing is used where a second left turn lane is needed to accommodate traffic demand, but widening of the intersection to add this lane is not feasible. In these situations, the through lane is reassigned to become a shared through-left turn lane. In this situation, it is necessary for the through movement and left turn movement to operate at the same time requiring the use of split

phasing. Split phasing is sometimes used where one side of an intersecting roadway has much heavier traffic than the other side. Unless there are specific lane assignments, which require the split phasing, it is inefficient for the intersection to operate under this configuration due to the lost time associated with two phases instead of one. In this instance, strong consideration should be given to modifying the phasing sequence so that the side street movements operate concurrently.

8.4 Controller Selection

Just as technology and the computer and communications industry continue to evolve, traffic signal control and motorist information systems are continually being upgraded or replaced. It is important that the designer propose equipment that will be compatible with the local system. The designer should contact the local maintaining agency to determine the exact requirements for the equipment to be installed at the intersection under design. Specific considerations include:

- Model and type of controller
- Interface panel
- Preemption
- Communication components

Within a signal system, one of the controllers may function as a master controller. A master controller cabinet will require additional panels and the requirements should be clearly described in the plans. The maintaining agency may want this cabinet to be configured with a telephone drop to facilitate communications back to the traffic management center. The plans should detail these requirements so that the contractor will fully understand the intent of this work. The designer will need to coordinate with the maintaining agency to ensure that a telephone account will be opened to facilitate the communications.

8.5 Controller Cabinet Location

The controller cabinet location should be carefully selected. Locations that appear to be appropriate in CADD files may be inappropriate in the field. The designer should consider items such as:

- Slope, elevation, and potential for standing water
- Driveways and sidewalks
- Off-tracking vehicles such as large trucks
- Keeping the cabinets within a corridor on one side of the roadway to ease communication cable installations
- Location of existing power transformers
- Ability of technician to see signal displays during troubleshooting
- Verify that the cabinet door can be opened and is accessible from within right of way (no fences or bushes, etc.)
- Consider generator pad and location of pad.

When installing a new cabinet, the old cabinet, base, and extra cabling and conduit should be completely removed from the project. If desired, the removed equipment should be delivered to the maintaining agency to be kept for spare parts.

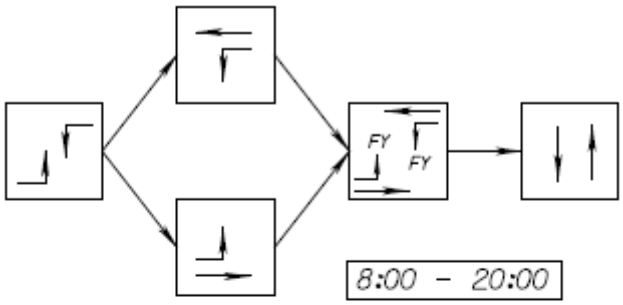
8.6 Numbering the Vehicle Movements

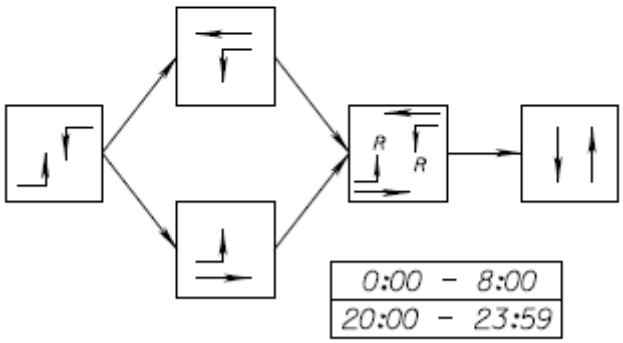
To properly assign movement numbers, the following rules should generally be followed:

- Movement 2 should be a main street through movement for southbound or westbound. Movement 6 should be the opposing main street movement (northbound or eastbound).
- The remaining through movement should then be assigned with even numbers increasing clockwise around the intersection. If a leg of the intersection is missing, this movement number should be skipped.
- The main street left turn movements should be assigned numbers 1 and 5 such that the sum of the through and left turn movements is always seven.
- The side street left turn movements should be assigned numbers 3 and 7 such that the sum of the through and left turn movements is always eleven.
- Right turn movements that are separately signalized are usually denoted with the adjacent through movement number with the addition of the letter “R” (i.e. – 2R, 4R, etc.).

8.7 Signal Operating Plan (SOP)

Standard SOPs can be found in the Design Standards (Index 17870). There are times that unique SOPs may be required. One example is the use of the Flashing Yellow Arrow. Below is a sample SOP that can be used with varying left turn phasing (by time of day). It is important to clearly convey the design intent in the plan set. Do not rely on contractor/maintain agency staff to interpret the intending signal operation.





9.0 TRAFFIC SIGNAL TIMINGS

9.1 Introduction

To improve efficiency and reduce travel time, many arterial roadways within District 5 have signal systems to coordinate the traffic signals within the system. In addition to providing compatible controller and communications equipment, the designer must take into consideration the implications of adding a new signal to the system. At a minimum, coordinated system timings must be developed to allow the new intersection to operate in coordination with the adjacent traffic signals in the system. Depending on the spacing and the operating characteristics of the new intersection, it may be necessary to develop a new set of system timings for the entire corridor, or it may be necessary to subdivide the existing system into separate subsystems. These considerations must be accommodated in the design of the new traffic signal. For non-FDOT projects the designer will be required to do this work. For FDOT projects, the District Traffic Operations Engineer (DTOE) should be consulted during the design process to determine whether or not development of new system timings will be required. At that point, the DTOE will also determine if pay items should be added to the plans to cover the work or if Department staff will assume responsibility for the timing modifications.

This chapter is only intended to provide simple guidance to aid signal designers. Detailed system timings should be developed and implemented by qualified individuals whenever a corridor is modified or created.

9.2 Timing

There are two basic types of timings that are entered into the traffic signal controller, local timings and system timings. Local timings should be developed or modified by the engineer and shown on the signal plans. System timings are developed after construction and are implemented and fine tuned after traffic patterns have adjusted for the post construction condition.

Local timings must accommodate all local operations at the intersection, including:

- Minimum Green (Initial)
- Maximum Green
- Extensions
- Yellow and Red Clearances
- Pedestrian Walk (7 seconds preferred, but can be as low as 4 seconds)
- Pedestrian Clearance
- Min. and/or Max. Recall (mainline is usually placed on min. recall or CNA)
- Detector Functions (NL is used in right turn lanes, protected-permissive lefts, and can be used for shared through-rights)
- Flash mode (the display each head should utilize during flash operation)

Additional timing plans are also developed for special circumstances. Some of these include:

- Railroad Preemption (needs entrance phasing, preempt phasing, and exit phasing)

- Emergency Vehicle Preemption
- School Zones
- Interstate Off-Ramps

Below are some general guidelines for signal timing in District 5. These are merely starting points used for very basic intersections. These guidelines are not intended to meet the needs of every intersection and should not replace sound engineering judgment:

- Side street movements and left turn movements should have 5 to 6 seconds for min. green and 3 seconds for extension.
- Max. green times are to be based on volumes; however, they may be approximately 50 seconds for the main line and 15 to 20 seconds for the side streets.
- Flashing Don't Walk time should be determined using 3.5 feet/second crossing speed.
- Minimum recall is generally used only on the main line.
- The minimum green for the main line can be reduced to 10 seconds when video detection is used since the detection zone is larger.
- Refer to Table 6.2 for mainline minimum green times and extension times.

9.3 Signal Clearance Time

See Section 3.6 of the Traffic Engineering Manual.

9.3.1 Pedestrian Clearance

The pedestrian clearance time shall be determined by this formula, where the crossing distance is defined from curb to curb (per the MUTCD).

$$\text{Pedestrian Clearance} = \frac{\text{Crossing Distance (ft)}}{3.5 \text{ ft/sec}}$$

Note that a more restrictive speed may be used per the MUTCD for special circumstances, at the engineer's discretion.

9.4 Coordination

Traffic signals can be coordinated through a variety of methods. These include time based coordination (TBC), hard-wire interconnect, closed loop interconnect, and central system control. When designing signal plans for an intersection within a signal system, it is important to know how the existing system is operating. Once the determination has been made, the designer will need to detail how the new signal will be connected to the system.

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. It is important to note that aerial fiber is not self-supporting, therefore, a messenger wire should be provided in the design plans.

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 feet 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 72 single-mode for signals. Utilize 12 strand cable into the cabinet with 100 feet of slack (minimum) in the adjacent pull box.

11.0 PREEMPTION

11.1 Introduction

Preemption is a powerful safety tool for the traffic engineer. When used properly, preemptions can allow vehicles to move quickly out of the path of other vehicles such as fire trucks and trains. However, when used incorrectly it can deteriorate the efficiency of an entire corridor.

11.2 Railroad Preemption

If a signal is near a railroad crossing, preemption must be considered as part of the signal design. Preemption is required when a signal is 200 feet or less from a crossing. When a signal is from 200 feet to 500 feet from a crossing a queue analysis is needed to justify not adding preemption. When preempted, the signal can be programmed to allow the vehicles to be flushed off the tracks. Afterwards, the vehicles traveling parallel to the train can continue. The engineer should evaluate the need for fiber optic blank-out signs to prohibit turning movements during the preemption phase.

The designer should also realize that railroad preemption overrides all other forms of preemption and immediately terminates the current phase, even if a pedestrian phase is active.

11.3 Emergency Vehicle Preemption

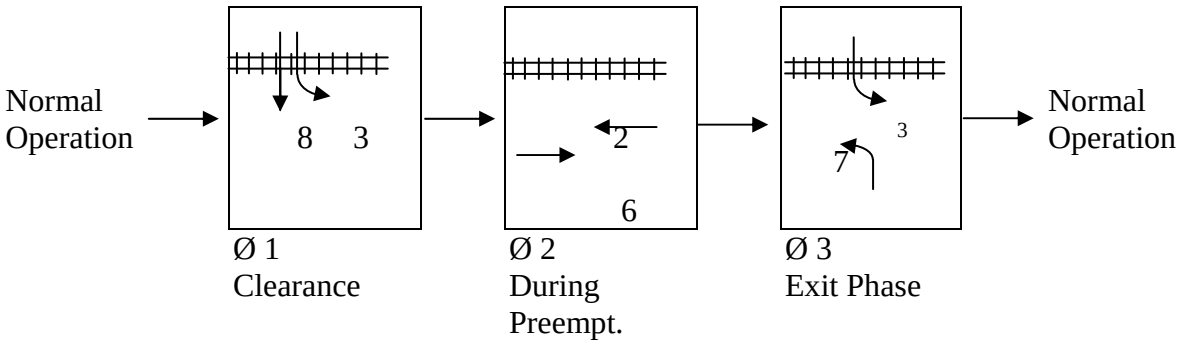
Many emergency vehicles are now using optical emitters to preempt the traffic signals. These flashing strobe lights provide a coded signal to the optical detector mounted over the roadway. When preempted, the signal will immediately begin the clearance portion of any phase opposing the oncoming emergency vehicle. Per, MUTCD Section 4D.13, the pedestrian clearance times may be terminated early during preemption. However, in District 5 the pedestrian clearance phase should be allowed to complete the full clearance interval before preempted phase is serviced. Once the clearance intervals have completed, all phases (including turn phases) for the approaching vehicle are usually programmed to display a green signal. Those phases will continue until the detector no longer receives the optical signal. At that point, the system will change to the exit phase before continuing in normal operation. The designer should clearly indicate the exit phase for each preempted approach.

Optical detectors should be replaced if a designer is impacting existing detectors at a signalized intersection. For modifications to an intersection without optical detectors, the maintaining agency should be consulted to determine if they would like the detectors added, and if so, for which approaches.

Some maintaining agencies have begun utilizing a GPS-based preemption system. Careful coordination with the maintaining agency should be exercised to ensure the proper equipment is provided in the controller cabinet.

11.4 Preemption Phase Plan and Timings

In order for the contractor to correctly install the preemption phases, the designer should show the preemption operating plan (POP) and the preemption timings, as necessary. This is especially important for train preemptions. Preemption plans for emergency vehicles do not generally require POP's (a chart showing the exit phases in conjunction with the preempted phase is adequate). Below is an example of a POP for a theoretical intersection with a nearby train crossing.



Please note that preemption plans are a crucial area of design. The engineer must be very familiar with rail crossing interface requirements with traffic signals before designing preemption plans. This POP is merely an example and should not be assumed to be the proper plan for any signal. With this example, timings would be provided for phase 1 to allow time for vehicles to clear the tracks. Phase 2 would operate as long as the crossing gates are down. For other intersections, the engineer must carefully determine the proper plan and phasing.

In order for preemption devices to be interpreted and utilized by the controller, additional preemption hardware is required. When installing a new cabinet, the pay item number should incorporate the appropriate number of preemption features. For retrofitting existing cabinets, a qualified technician will need to determine what modifications will be required.

12.0 SIGNAL MAINTENANCE OF TRAFFIC DURING CONSTRUCTION

12.1 Introduction

During construction projects, the traffic signals are often impacted for extended periods of time. Although the signal hardware is often preprogrammed to avoid conflicting displays and to deal with loss of vehicle detection, the methods used result in very inefficient intersection operation. To help minimize these impacts, the Department requires certain unavoidable problems be addressed during the design phase and included in the signal plans.

12.2 Disruption of Signal Operation

When a traffic signal must be turned off or put into flash mode a traffic control officer should be on the scene to direct traffic. Usually, these periods can be limited to just a few hours during the changing out of poles, signal displays, or controller cabinets. Every effort should be made in the design phase to minimize or remove the necessity of turning off the traffic signal.

12.3 Loss of Vehicle Detection

During reconstruction or milling and resurfacing projects, there is often no way to avoid destruction of the existing loops in the roadway. Even projects that do not destroy the loop itself often destroy the lead-in cable, disconnecting and therefore destroying the loop. For projects where the detection is expected to be out for more than a week, effective temporary detection should be used. On simple intersection improvements, requirements should be stated in the plans that the loops are to be replaced within a certain period of time.

The following temporary configuration has been developed:

12.3.1 Temporary Detection

All movements shall be actuated during construction efforts. Temporary detection units should be positioned to avoid “false call” detection of cross traffic or vehicles traveling in other detection zones. The equipment shall only detect the intended movement. The following note should be added to the plans:

“In the event permanent vehicle detection is disrupted, provide an alternative means of detection to all lanes approaching the intersection, separating each movement which previously had detection. The type of detector shall be approved by the Engineer prior to installation. Equipment shall only detect the intended movement.”

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 a structural calculation/report (for strain poles). Traffic Operations will coordinate the review of this information with our Geotech, Structural Design, and Structures & Facilities 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.

Subsurface utility exploration (SUE) reports are a requirement for any new strain pole or mast arm that is proposed. Verifying the proposed foundation locations are clear of

utility conflicts during the design phase can save the permitee months of delay and additional construction costs.

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 Structural 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)
- Drilled Shaft Inspection Report
- 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.

14.0 REFERENCES

14.1 Traffic Signal Design References

Manual of Traffic Signal Design, Kell and Fullerton
Manual on Uniform Traffic Control Devices, Federal Highway Administration
Design Standards, Florida Department of Transportation
Standard Specifications for Road and Bridge Construction, Florida Department of Transportation

14.2 Contacts for Maintaining Agencies

The government agency (usually a city or county) that has accepted responsibility to maintain a traffic signal on a state roadway is known as the maintaining agency. A list of the maintaining agencies in District 5 is available upon request.

Revised 1/10/11

REVISONS

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.

11/18/2008

- Section 12.3.1 – Clarified temporary detection use.

12/31/2008

- Section 3.2 – Included single-span configurations
- Section 3.4 – Galvanized mast arms vs. painted mast arms
- Section 4.9 – Added section regarding signal heads near bridges.

6/30/2009

- Section 4.9 – Added need for Design Variation if vertical clearance is not met.

1/15/2010

- Section 3.0 – Incorporated 4-section signal head into Section.
- Section 3.1 – Added clear zone diagram.
- Section 3.1 – Added line regarding constructability (installation of foundations).
- Section 4.0 – Incorporated 4-section signal head into Section
- Section 4.8 – Modified backplate section.

Revised 1/10/11

- Section 4.9 – Modified the line of sight section.
- Section 5.2 – Removed "Left Turn Must Yield on Green" sentence.
- Section 6.3 – Video Detection Mounting
- Section 8.7 – Standard Operating Plan
- Section 10.1 – Added sentence to include messenger wire for aerial cable runs.
- Section 10.1 – Revised fiber count to 72 single-mode.
- Section 11.3 – Clarified District's preference regarding emergency vehicle pre-emption vs. pedestrian clearance interval.
- Section 12.3 – Mainline through movements shall be actuated.

9/13/2010

- Section 12.3 – Added temporary detection note.

1/10/2011

- Section 3.3 – Modified sag of centenary wire for two-point attachment. Added sag information for single-point attachment.
- Section 3.4 – Modified distance from bottom of signal assembly to center of mast arm to include backplate.
- Section 3.6 – Modified maximum mast arm length.
- Section 4.10 – Added audible pedestrian section.
- Section 10.2 thru 10.5 – Removed sections on signal control systems.

Florida Department of Transportation
District 5

Guidelines for Signing and Pavement Markings Plan Preparation

Revised 1/10/11

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REVISONS

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.

3.0 BIKE LANE DESIGNATIONS

Bike facilities shall be considered with all new FDOT projects. The designer shall consult the Plans Preparation Manual (Chapter 8) for direction and design alternatives. Early coordination with the District Roadway Design Engineer and District Traffic Operations Office is encouraged.

3.1 Use of the bike manual vs. Design Standards

The FDOT Design Standards should be used for guidance regarding bike lane pavement markings.

When striping designated bike lanes, place the two markings per the Design Standards, Index 17347. The two bike lane pavement symbols should be paid for as a single pavement marking message.

When providing signs for designated bike lanes sound engineering judgment should be exercised for spacing (i.e. after signalized intersection, major intersections, major driveways, etc.).

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 17347.

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. 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. It is important to note that w4-2, W9-1 and W9-2 sign should not be used in lane drop designs. 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 17347.

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 the bike lane lines (6-inch white). The RPMs should not be placed

within the bike lane travel-way, but in the adjacent through lane and adjacent right turn lane.

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.

4.4 Striping of taper

In general, single turn lanes should be constructed with a 50 foot taper while dual turn lanes have a 100 foot taper. In rural areas, it is preferable to square off the asphalt and merely stripe the taper. This allows the contractor to build the entire turn lane at a constant width, which minimizes the labor required for construction. The square taper also allows for easy extensions of turn lanes if required in the future.

When squaring off a taper at the beginning of a turn lane, stripe out the triangle of unused pavement. This should be done with a 6-inch stripe and 18-inch gore stripe placed 10-foot center-to-center.

4.5 Bi-directional turn lanes

The Design Standard shows two different schemes that can be used for bi-directional turn lanes. The preferred method is to use Scheme 1. Scheme 2 is used when an identifiable safety problem exists or is anticipated. For example, when offset side streets create conflicting lefts as motorists enter the mainline. In either case, Standard Index 17346 should be followed as closely as possible.

4.6 Continuous turn lanes across an intersection

In some locations, right turn lanes extend through one or more intersections prior to the designed termination point. This practice is discouraged and every effort should be made to remove the pavement on the receiving side of the intersection by creating a “bulb-out”. If the “bulb-out” design is not practical, a painted gore area can be used.

In locations where the right turn lane needs to be continuous through an intersection, coordinate with District Five Traffic Operations for concurrence. If a continuous turn lane is provided, it should eventually end utilizing “ONLY” pavement messages and Right Lane Must Turn Right signs.

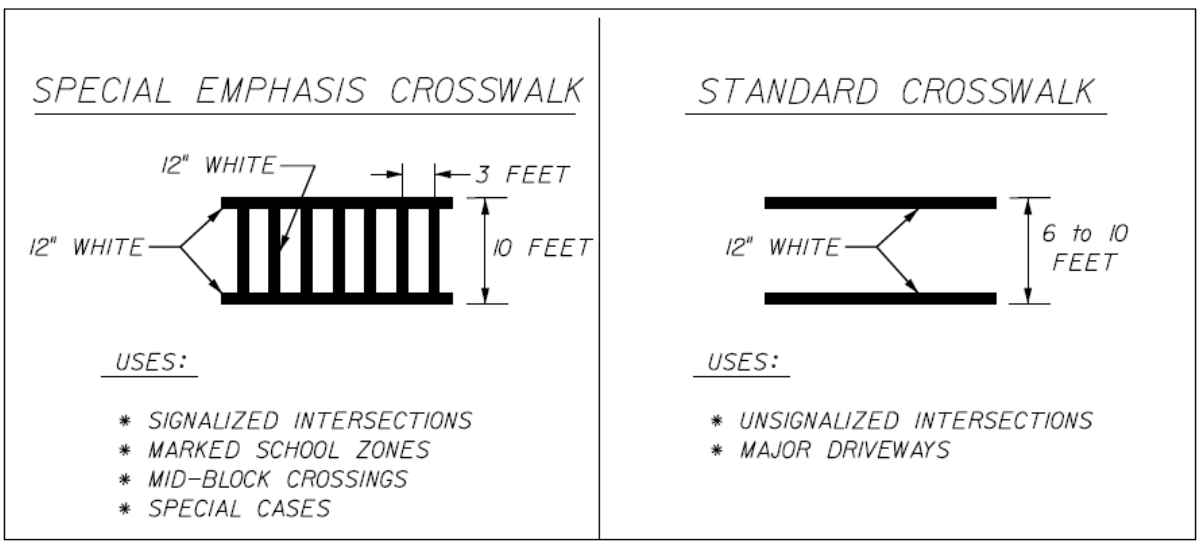
5.0 SIGNALIZED INTERSECTIONS

5.1 Bike Lanes at signals

The striping of bike lanes at signalized intersections is shown in the Design Standards (Index 17347). Loops are not required for bike lanes in District 5, unless currently existing or requested by Traffic Operations. However, with recent advancement in technology, video detection has the ability to provide a separate detection zones for bike lanes. Therefore, a detection zones for bikes should be considered with the use of video detection. Bike lanes adjacent to a right turn lane should be 5-feet wide when possible.

5.2 Crosswalks

Per Chapter 8 in the Plan Preparation Manual (Volume 1), marked crosswalks shall be provided at all side streets where pedestrian facilities meet the roadway. Below are two diagrams that depict the options to use in District 5. Note the "Special Emphasis" crosswalk scheme reflects Index 17346; however, District 5 prefers 12-inch longitudinal lines with 12-inch edges (see diagram below). Crosswalks should have a 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 one 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. (See Signalization Guidelines Section 6.2 for loop placement)

5.5 Stop bars

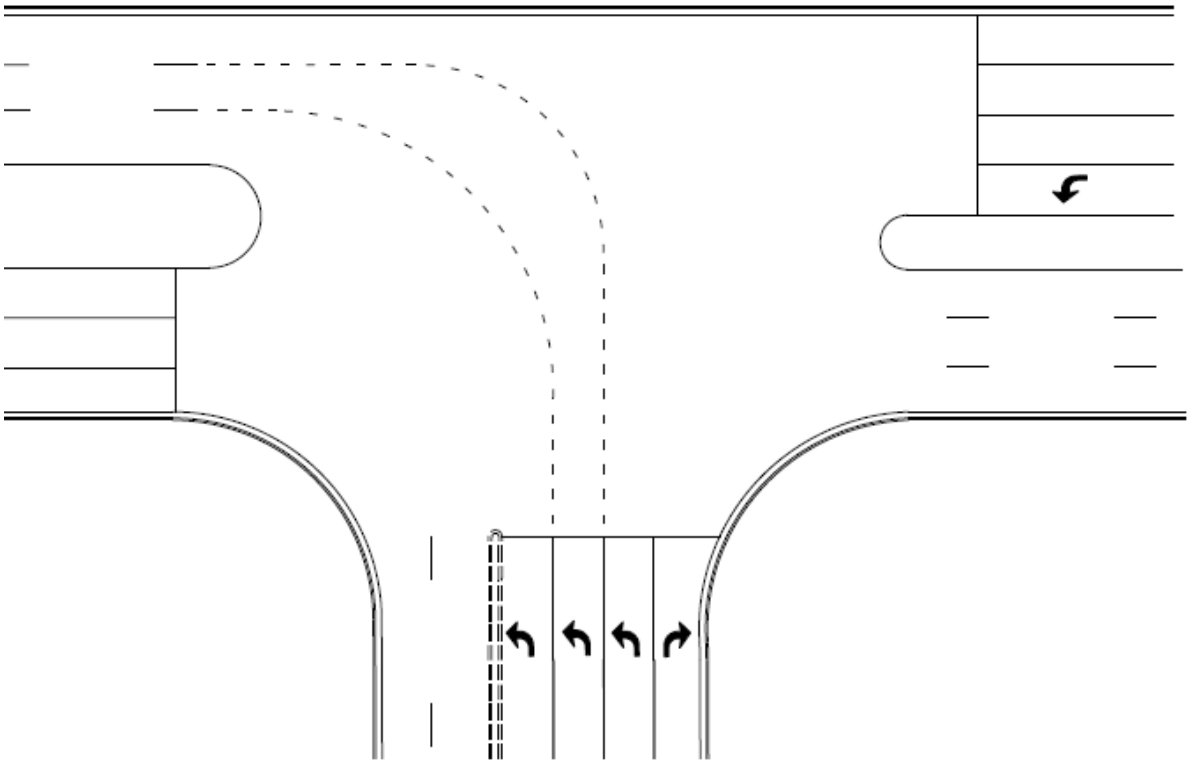
Although there are many non-standard intersections within the District, it is desirable to maintain consistency of stop bar placement throughout the area. In order to do so, these general guidelines should be followed:

- 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. In general, the stagger should not exceed 15-feet.
- 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 (see diagram below).



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 nose 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 (if pedestrian facilities are not currently provided).

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 (6’-10’ skip yellow) across full 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 (705-11-1) 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 be used at the beginning of a raised median (i.e. transition from a two-lane to four-lane section, end of a bi-directional left turn lane, etc.)

6.4 Pavement Marking for Isolated Raised Medians

The District has some location along corridors, with high volumes of pedestrians, where pedestrian refuge islands are provided. Special signing and pavement markings should be provided to help drivers identify the raised median. Some items to consider are:

- Yellow nose paint
- RPMs placed on the nose of the median
- Keep right and object markers
- Pedestrian warning signs
- Turn restrictions (i.e. No-Left Turn, No U-turn)

Special attention should be exercised when placing the signs to ensure proper visibility of each sign panel.

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.
- Attention to the side street or driveway lane configurations. (i.e. left turn path to the side street)

7.2 Signing Design

The signing at full median openings for divided highways should comply with FDOT Design Standard Index 17346 (sheet 5 of 14). Figure 1 is for median noses less than 30 feet and Figure 2 is for median noses greater than 30 feet. There are instances where an intersection may have median noses of varying width (i.e. one side has a turn lane and the other side does not). If an intersection is encountered that has a median nose less than 30 feet and a median nose greater than 30 feet, use Figure 2.

It is acceptable to place the Divided Highway sign (R6-3) under the Stop sign in Figure 2.

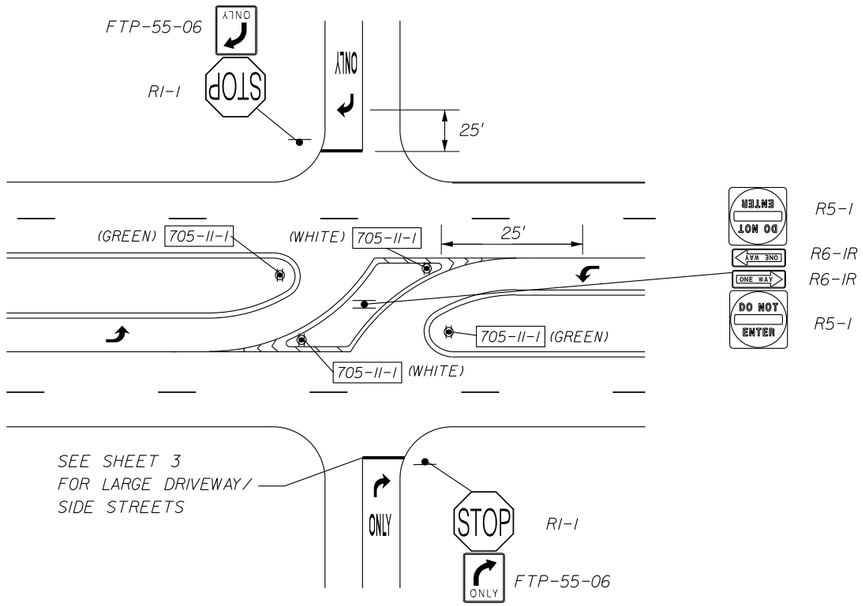
The details shown on the following pages primarily pertain to directional median openings.

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 50 feet before the wrong way approach of a directional opening.

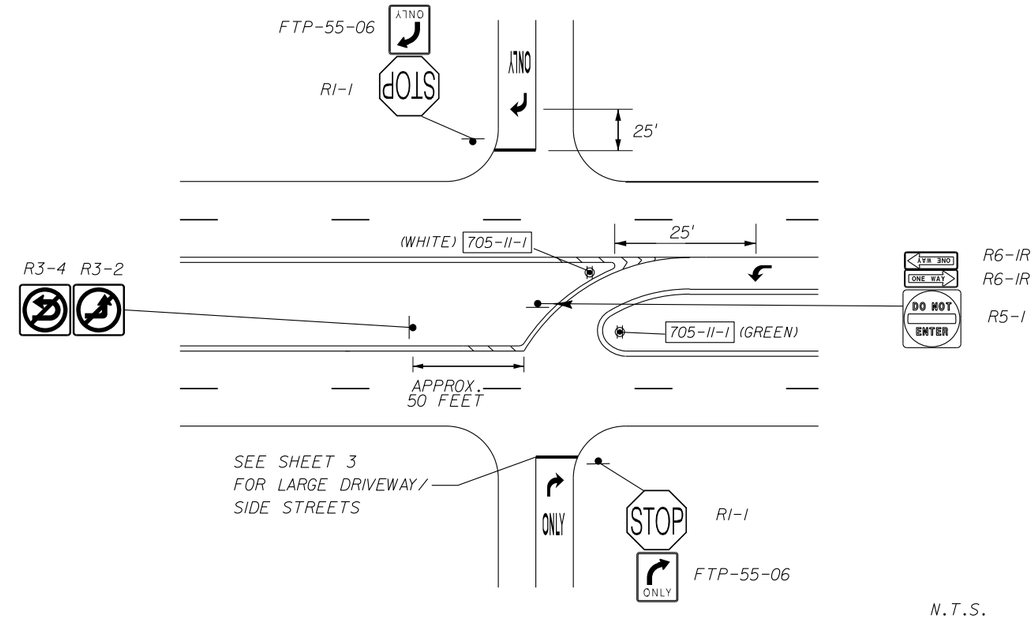
7.3 Delineators

In addition to signs, delineators should be placed at specific locations at directional median openings. Specifically, tubular white (single-sided) delineators (705-11-1) 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.



BI-DIRECTIONAL MEDIAN SIGNING



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 1/15/10

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

DISTRICT 5 GUIDELINES FOR MEDIAN SIGNING

SHEET NO. 1

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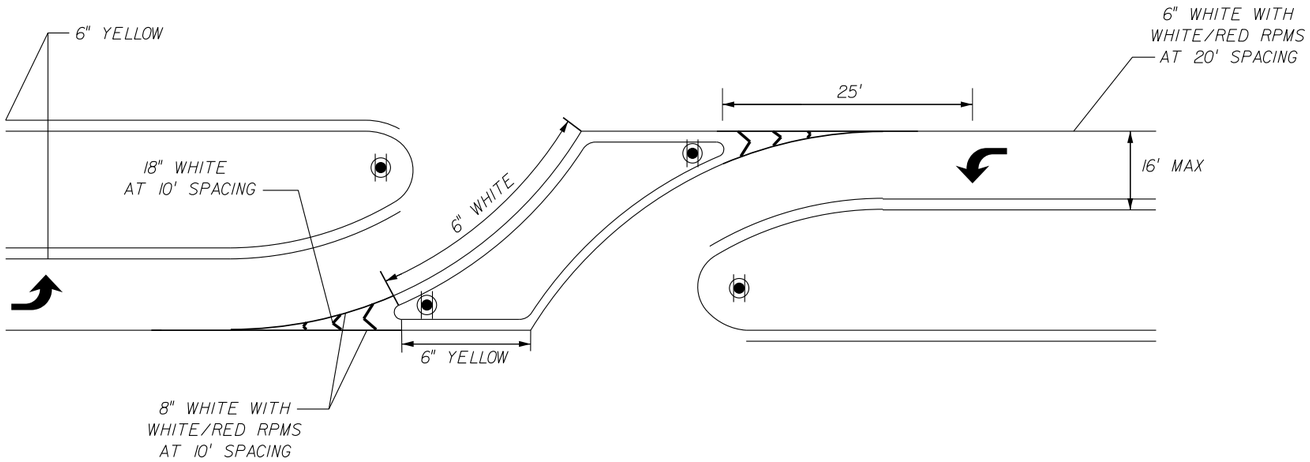
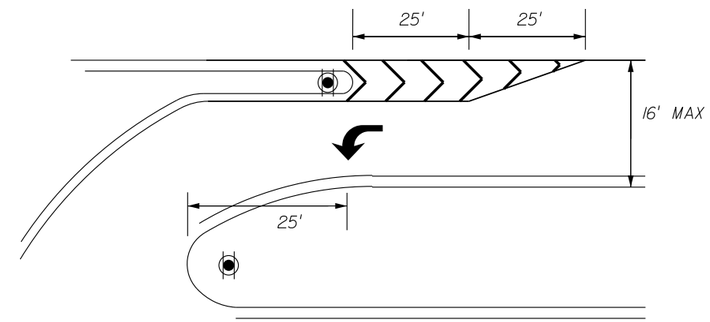


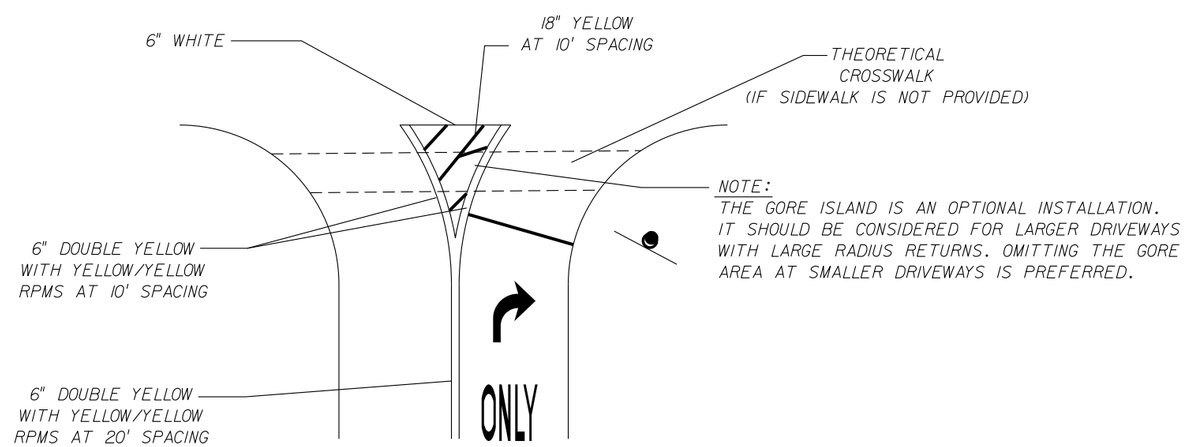
N.T.S.

BI-DIRECTIONAL MEDIAN STRIPING FOR TURN LANES 12-FEET TO 15-FEET



N.T.S.

APPROACH STRIPING FOR TURN LANES THAT EXCEED 12-FEET



N.T.S.

LARGE SIDE STREET AND DRIVEWAY STRIPING FOR RIGHT-IN/ RIGHT-OUT CONDITION

REVISED 1/15/10

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

DISTRICT 5 GUIDELINES
MEDIAN & SIDE STREET STRIPING

SHEET NO. 2

8.0 SIDE STREETS

8.1 Pavement Marking Design

During milling and resurfacing or widening projects, the asphalt tracking on the tires of vehicles will affect side streets in the project area. The tracked asphalt may cover some of the pavement markings on the side street. To overcome this tracking at signalized intersections, side streets should be restriped for 100 feet back from the new asphalt limits (50 feet for unsignalized intersections).

8.2 Signing Design

In addition to the signs required by the MUTCD, street name signs should be considered in each design. In many areas, specially designed signs are already in place and are suitable for relocation. In other locations, street name signs may be added by the local agency to meet the local agency preferences. Special care should be taken to ensure that the signs can be properly mounted on an approved post. The post size can be determined through the tables in the Design Standard. If any street name signs are removed they should be given to the maintaining agency (if desired).

There are instances where signs located within the Department right-of-way are not maintained by FDOT forces. These signs typically provide information for local facilities such as driveways and side streets. Examples include Stop signs, Dead End signs, No-Parking signs, etc. and are typically facing side street traffic. A portion of these signs are attached to non-standard posts (i.e. square post, u-channel post, etc.). In these cases, the designer shall coordinate with the local maintaining agency to determine if the sign assembly should remain on the existing post or if the assembly should be replaced with the standard FDOT round post. If regulatory signs (i.e. stop signs) are in poor condition or inappropriately mounted (height, offset, etc.) they should be replaced with an FDOT assembly unless the Maintaining Agency agrees to correct the issue.

For locations without curb and gutter, existing No Parking On Right Of Way signs in place are to be replaced by No Parking Anytime signs with the arrow(s) pointing in the appropriate direction(s) of the prohibition. These signs should also be installed 30 to 45 degrees from parallel for better visibility by oncoming traffic, in agreement with MUTCD.

9.0 SIGNING

9.1 Guide Signs

Guide Signs and other signs should be designed using the MUTCD and & 6.3 of the Traffic Engineering Manual and the Standard Highway Signs. In District 5, generally only 1 advance guide sign is used in rural areas and 2 in urban areas (space permitting). The only place 3 primary advance signs are used is where 2 limited access facilities intersect. Overhead signs are used for all advance guide signs on limited access roads with 3 lanes or more. With surface streets engineers should apply judgment in specifying letter sizes. For example, a 2-lane roadway with a 55 MPH posted speed limit may have a destination with such a long name (Howey-In-The-Hills) that use of 10.66" / 8" letters may result in a sign width close to the width of the entire road. In such cases, be prudent in the application of the sizes set forth in Section 6.3.

When designing non-standard signs, use Section 2E.16 of the 2009 MUTCD for border widths and corner radii. In District 5, we prefer the area outside the corner radii rounded.

For interstate projects, prepare a master sign plan before designing sign panels. The master sign plan should be submitted to the FDOT Project Manager and Traffic Operations for review. This coordination should help streamline the design process

9.2 Speed Limit Signs

Large speed limit signs panels (36"x48") should be used unless design constraints do not make it feasible.

For advance warning signs and other sign spacing based on speed limit, the designer should use the design speed for the roadway section and ensure proper spacing along the corridor is met. Refer to Table 4-5 from the ITE Traffic Control Handbook for sign spacing.

10.0 MISCELLANEOUS PAVEMENT MARKINGS

10.1 Blue RPMs

The placement of blue RPMs for widening projects shall adhere to Section 4.3 of the Traffic Engineering Manual, which states the local government is responsible for the installation/maintenance of the blue RPMs. For resurfacing projects, the following note shall be placed in the plans:

"The contractor shall remove and replace all existing blue RPMs within the project limits. The cost of the blue RPMs shall be included under pay item number XXXX."

XXXX = 710-90 or 706-3 depending on project pay item numbers.

Location of the blue RPMs or quantity for the project is not required in the design plans; however, the designer may include in the plans if he/she feels it will help clarify the design. Coordination with the local agency should be completed by the designer, to ensure the agency is aware of the need to verify RPM placement after the final acceptance of the project. Please consult the Traffic Operations Department for clarification.

REVISONS

The following is a summary of significant revisions that were made to previous iterations of the Signing and Pavement Marking Guidelines:

1/16/2008

- Section 5.5 – Removed 75-foot reference for turn radii.
- Section 5.6 – Revised 75-foot turn radius to "accommodate vehicle-type". Text added regarding triple left turn lanes.
- Section 6.1 – Removed reference to 75-foot turn radius.
- Section 7.0 Details – Updated sign codes.
- Section 7.0 Details – Modified median nose and width references.
- Section 7.0 Details – Provided 16-foot left turn lane maximum width.
- Section 7.0 Details – Incorporated "theoretical crosswalk" for side street/driveway scenarios.
- Section 8.2 – Provided reference to MUTCD.
- Section 9.1 – Master Sign Plan for Interstate Projects.
- Section 10.1 – Included pay item number 710-90.

3/6/2008

- Section 8.0 – Specified street name signs are provided by the local agency.

11/18/2008

- Section 8.2 – Replacement of signs with non-standard posts.

1/2/2009

- Section 3.0 – Revised Bike Lane section.
- Section 7.0 – Details – Modified median nose and width references.

9/30/2009

- Section 5.2 – Clarified crosswalk scheme (special emphasis design).
- Section 9.2 – Removed Speed Limit Sign Note.

1/15/2010

- Section 5.1 – Consider bike lane detection if video detection is provided.
- Section 5.2 – Revised crosswalk scheme (special emphasis design).
- Section 5.4 – Added reference to Signal Guidelines for loop spacing.
- Section 5.5 – Added stagger stop bar information.
- Section 6.4 – Added section to address Isolated Raised Medians.
- Section 7.1 – Removed white nose paint sentence and added sentence calling attention to turn paths into driveways.
- Section 7.0 – Details – Removed sign R3-18 and adjusted distance.
- Section 7.0 – Details – Removed white nose paint call-out.
- Section 7.0 – Details – Added note regarding optional gore island.

1/10/2011

- Section 3.1 – Removed reference to *Bicycle Facilities Planning and Design Handbook*.
- Section 5.2 – Revised Crosswalk section.
- Section 7.2 – Referred to Index 17346 for median signing.
- Section 7.0 Details – Removed signing detail for full median openings.
- Section 10.1 – Revised General Note, as Blue RPM placement is covered in the *Traffic Engineering Manual*.

TRK # 850076

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

CONTRACT PLANS

FINANCIAL PROJECT ID 407573-1-52-01
(FEDERAL FUNDS)
SEMINOLE COUNTY (77160)
STATE ROAD NO. 400

COMPONENTS OF CONTRACT PLANS SET

- ROADWAY PLANS
- SIGNING AND PAVEMENT MARKING PLANS
- SIGNALIZATION PLANS
- LIGHTING PLANS
- STRUCTURAL PLANS

A DETAILED INDEX APPEARS ON THE KEY SHEET OF EACH COMPONENT

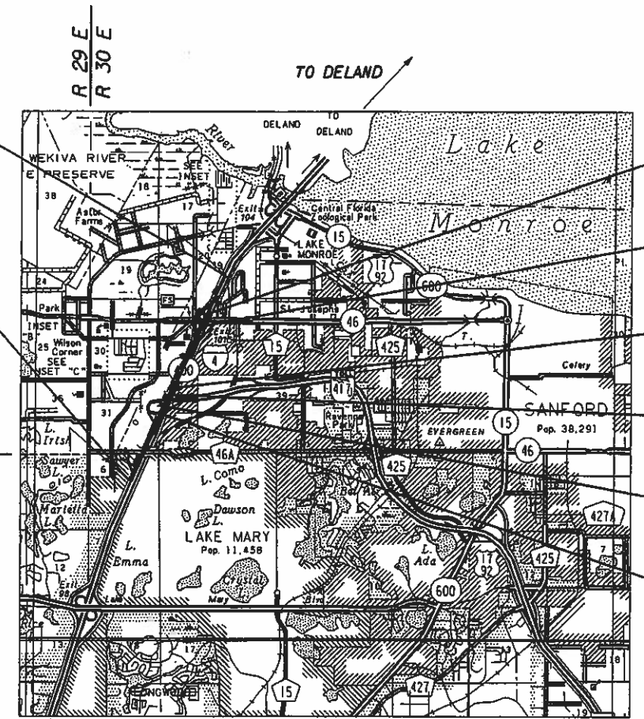
INDEX OF ROADWAY PLANS

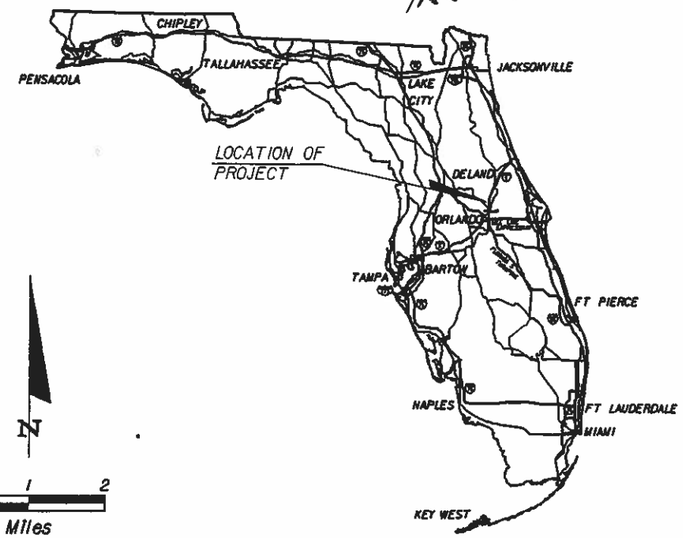
SHEET NO.	SHEET DESCRIPTION
1	KEY SHEET
2-6	SUMMARY OF PAY ITEMS
7-8	DRAINAGE MAP
9	EXISTING DRAINAGE STRUCTURES
10	INTERCHANGE DRAINAGE MAP
11-24	TYPICAL SECTION
25-29	SUMMARY OF QUANTITIES
30-33	SUMMARY OF DRAINAGE STRUCTURES
34-35	OPTIONAL MATERIALS TABULATION
36-38	PROJECT LAYOUT
39	REFERENCE POINTS
40	GENERAL NOTES
41-45	COORDINATE AND CURVE DATA
46-47	RELATIVE POSITION DIAGRAM
48-79	ROADWAY PLANS
80-103	ROADWAY PROFILE
104-110	INTERCHANGE LAYOUT
111-126	RAMP TERMINAL DETAILS
127-130	RETENTION POND DETAILS
131	DRAINAGE DETAILS
132-203	DRAINAGE STRUCTURES
204-210	CROSS SECTION PATTERN
211	ROADWAY SOIL SURVEY
212	REPORT OF MUCK PROBES
213-215	REPORT OF SPT BORINGS FOR WBCD
216-380	ROADWAY CROSS SECTIONS
381-389	POND CROSS SECTIONS
390-392	STORMWATER POLLUTION PREVENTION PLAN
393-535	TRAFFIC CONTROL PLANS
536-568	UTILITY ADJUSTMENT

GOVERNING STANDARDS AND SPECIFICATIONS:
FLORIDA DEPARTMENT OF TRANSPORTATION,
DESIGN STANDARDS DATED 2008,
AND STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION DATED 2007,
AS AMENDED BY CONTRACT DOCUMENTS.

APPLICABLE DESIGN STANDARDS MODIFICATION :

For Design Standards Modifications click on "Design Standards" at the following web site:
http://www.dot.state.fl.us/rddesign/





ROADWAY SHOP DRAWINGS TO BE SUBMITTED TO:

STEPHEN W. DICKISON, P.E.
URS
315 E. ROBINSON ST. SUITE 245
ORLANDO, FL 32801-1949

PLANS PREPARED BY:

URS

315 E. ROBINSON ST. SUITE 245
ORLANDO, FL 32801-1949
PH (407) 422-0353, FAX (407) 423-2695
CONTRACT NO. C8D95
CERTIFICATE OF AUTHORIZATION
NO. 000002
VENDOR NO. F592087895002

NOTE: THE SCALE OF THESE PLANS MAY HAVE CHANGED DUE TO REPRODUCTION.

AT&T FLORIDA

"PLANS ON SHELF" SUBMITTAL
NOVEMBER 29, 2007

PLANS UPDATE PHASE NOTES

1. THE ITS PLANS ARE NOT INCLUDED SINCE THE DESIGN WAS NOT COMPLETED UNDER THE ORIGINAL CONTRACT AND NEEDS TO BE ADDRESSED DURING THE UPDATE PHASE.
2. A COMMITMENT WAS MADE DURING THE PD&E TO PERFORM AN ENVIRONMENTAL SURVEY OF THE PROJECT TO IDENTIFY GOPHER TORTOISE AND BURROWING OWL HABITATS. THESE SURVEYS NEED TO BE PERFORMED DURING THE UPDATE PHASE.
3. THE EXISTING ITS AND LIGHTING UTILITIES SHOWN IN THE PLANS WERE NOT FIELD LOCATED AND NEED TO BE ADDRESSED DURING THE UPDATE PHASE.
4. A 12" GAS MAIN (FGT) RUNS ALONG SOUTH OREGON STREET, FROM BILL HEARD CHEVROLET TO THE COURTESY FORD PROPERTY. THESE PLANS SHOW 4 CONFLICT LOCATIONS BETWEEN THE PROPOSED DESIGN AND THE EXISTING GAS MAIN. CONFLICT #1 IS LOCATED BETWEEN RAMP D AND THE BILL HEARD PROPERTY. A PROPOSED DBI, PIPE, AND MES INTERSECT THE EXISTING GAS MAIN. CONFLICT #2 IS LOCATED ALONG RAMP DI. AN 18" PIPE BETWEEN S-104 AND S-105 INTERSECTS THE EXSTING GAS MAIN. CONFLICT #3 IS LOCATED BETWEEN RAMP DI AND SR 46. AN 18" PIPE BETWEEN S-103 AND S-118 INTERSECTS THE EXISTING GAS MAIN. CONFLICT #4 IS LOCATED ALONG RAMP A, SOUTH OF SR 46, NEAR COURTESY FORD. A 24" PIPE THAT CONNECTS TO AN EXISTING CROSS DRAIN INTERSECTS THE EXISTING GAS MAIN. THE UTILITY ADJUSTMENT PLANS SHOW RELOCATION OF THE GAS LINE AT CONFLICT LOCATION #4. ADDITIONAL DESIGN REVISIONS WILL BE REQUIRED DURING THE UPDATE PHASE TO ELIMINATE THE CONFLICT AT LOCATIONS #1, #2, AND #3.

PROJECT LENGTH IS BASED ON ℄ OF CONSTRUCTION

LENGTH OF PROJECT

	LINEAR FEET	MILES
ROADWAY	18,604.00	3.523
BRIDGES	0.000	0.000
NET LENGTH OF PROJECT	18,604.00	3.523
EXCEPTIONS	0.00	0.00
GROSS LENGTH OF PROJECT	18,604.00	3.523

FDOT PROJECT MANAGER: BEATA STYS-PALASZ, P.E.

KEY SHEET REVISIONS		
DATE	BY	DESCRIPTION

ROADWAY PLANS
ENGINEER OF RECORD: STEPHEN W. DICKISON, P.E.

P.E. NO.: 56129

FISCAL YEAR	SHEET NO.
14	1

RAL 1-5-10

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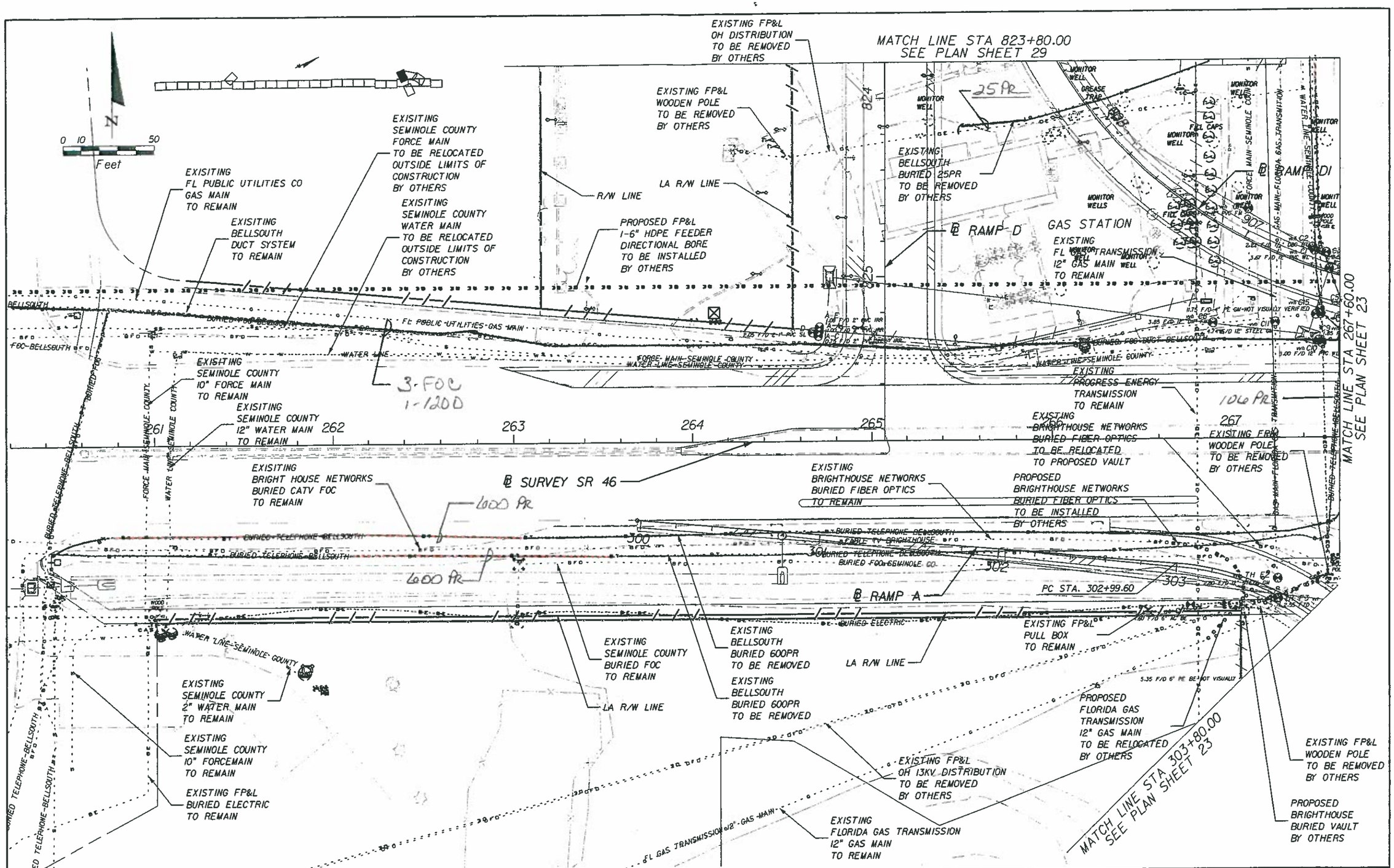

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REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

TBE GROUP, INC.
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PHONE: (407) 629-7144
CIVIL ENGINEERING • TRANSPORTATION • ENVIRONMENTAL • PLANNING • UTILITY ENGINEERING/LOCATING
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JERALDO COMELLAS, JR. P.E. NO. 45838

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
400	SEMINOLE	407573-1-52-01

UTILITY ADJUSTMENT SHEET (27)
STA 260+89.90 TO STA 268

SHEET NO. 564

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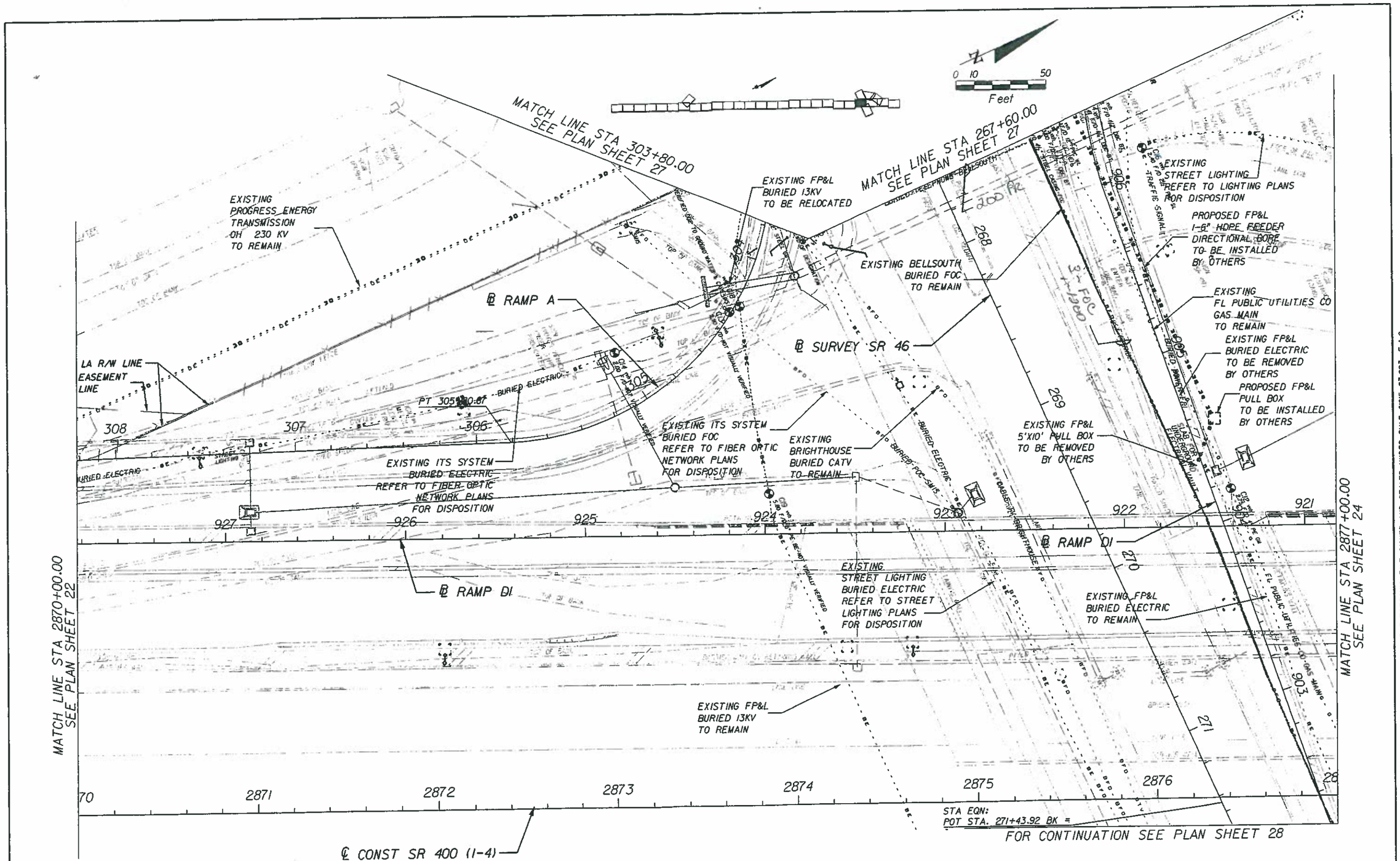

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STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
400	SEMINOLE	407573-1-52-01

UTILITY ADJUSTMENT SHEET (23)

SHEET NO. 559

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EXISTING BELLSOUTH BURIED FOC TO REMAIN

EXISTING FP&L BURIED ELECTRIC TO REMAIN

EXISTING FL PUBLIC UTILITIES CO GAS MAIN TO REMAIN

℄ RAMP DI

LA R/W LINE

EXISTING STREET LIGHTING REFER TO LIGHTING PLANS FOR DISPOSITION

N

0 10 50
Feet

STREET LIGHTING

TOE OF BANK

GAS MAIN

TOP OF BANK

STREET LIGHTING

PAVED SHLDR

BT DUCT BELLSOUTH

902

901

900

PAVED SHLDR

3-FOC

LANE LINE

FOR CONTINUATION SEE PLAN SHEET 23

78 79 80 81 82 83 84

℄ SURVEY SR 46

END CONSTRUCTION
END MILLING AND RESURFACING
STA 80+30.84
℄ SURVEY SR 46

LANE LINE

CATV CABLE TV

PAVED SHLDR

TOP OF BANK

FIBER OPTIC CABLE

PAVED SHLDR

TOE OF BANK

EXISTING STREET LIGHTING BURIED ELECTRIC REFER TO STREET LIGHTING PLANS FOR DISPOSITION

EXISTING BRIGHTHOUSE BURIED CATV TO REMAIN

EXISTING ITS SYSTEM BURIED FOC REFER TO FIBER OPTIC NETWORK PLANS FOR DISPOSITION

LA R/W LINE

C20 m/h
2.00 F/D 6" PE BE

EXISTING FPL BURIED 13KV TO REMAIN

BURIED ELECTRIC

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REVISIONS					
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STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
400	SEMINOLE	407573-1-52-01

UTILITY ADJUSTMENT SHEET (28)
STA 77+80.00 TO STA 84+45.00

SHEET NO. 565

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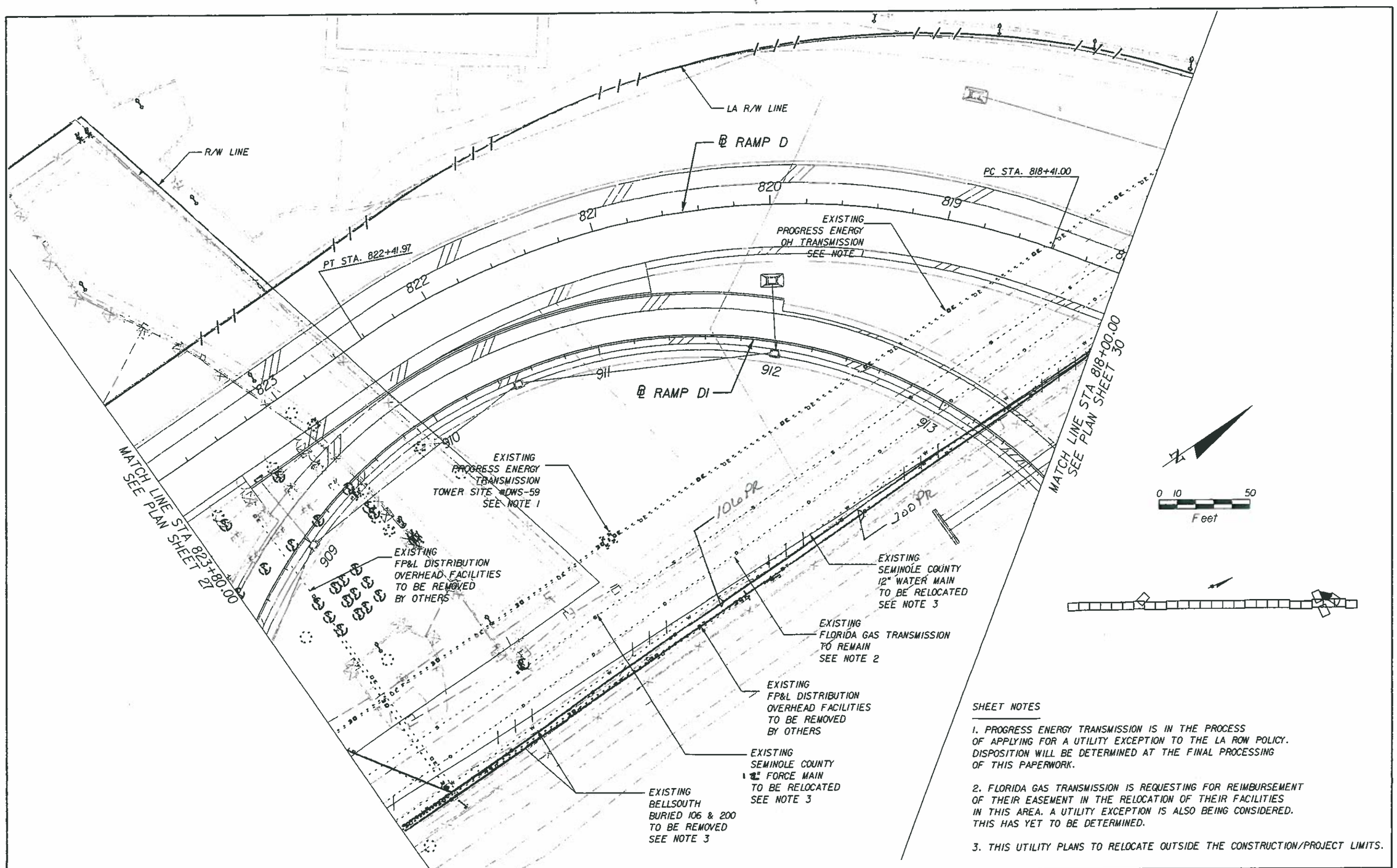

SHEET NOTES

1. PROGRESS ENERGY TRANSMISSION IS IN THE PROCESS OF APPLYING FOR A UTILITY EXCEPTION TO THE LA ROW POLICY. DISPOSITION WILL BE DETERMINED AT THE FINAL PROCESSING OF THIS PAPERWORK.

2. FLORIDA GAS TRANSMISSION IS REQUESTING FOR REIMBURSEMENT OF THEIR EASEMENT IN THE RELOCATION OF THEIR FACILITIES IN THIS AREA. A UTILITY EXCEPTION IS ALSO BEING CONSIDERED. THIS HAS YET TO BE DETERMINED.

3. THIS UTILITY PLANS TO RELOCATE OUTSIDE THE CONSTRUCTION/PROJECT LIMITS.

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REVISIONS					
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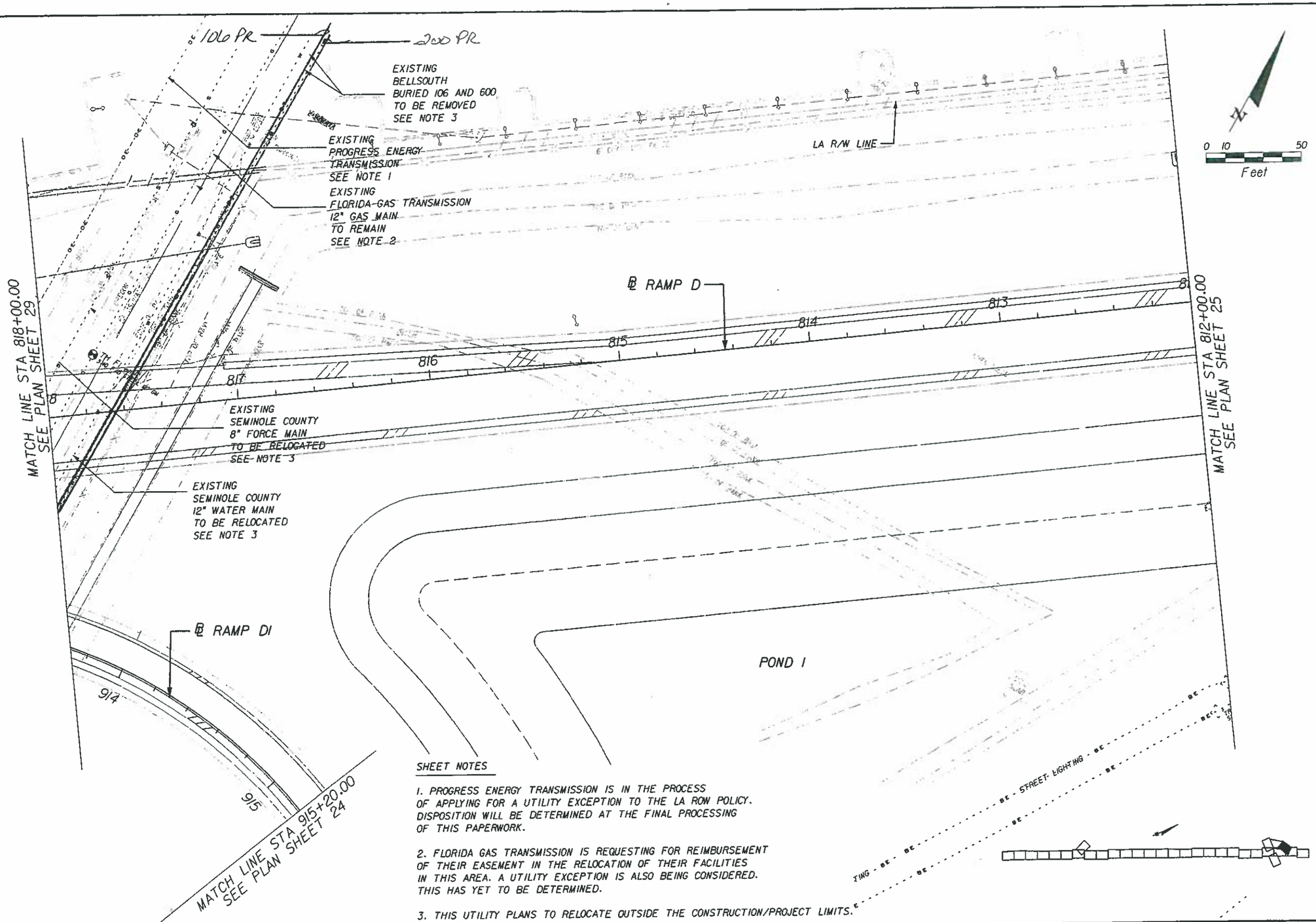
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
400	SEMINOLE	407573-1-52-01

UTILITY ADJUSTMENT SHEET (29)
STA 824+00.00 TO STA 818+00.00

SHEET NO. 566



SHEET NOTES

1. PROGRESS ENERGY TRANSMISSION IS IN THE PROCESS OF APPLYING FOR A UTILITY EXCEPTION TO THE LA ROW POLICY. DISPOSITION WILL BE DETERMINED AT THE FINAL PROCESSING OF THIS PAPERWORK.

2. FLORIDA GAS TRANSMISSION IS REQUESTING FOR REIMBURSEMENT OF THEIR EASEMENT IN THE RELOCATION OF THEIR FACILITIES IN THIS AREA. A UTILITY EXCEPTION IS ALSO BEING CONSIDERED. THIS HAS YET TO BE DETERMINED.

3. THIS UTILITY PLANS TO RELOCATE OUTSIDE THE CONSTRUCTION/PROJECT LIMITS.

NOTICE: THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE SIGNED AND SEALED UNDER RULE 61G15-23.003, F.A.C.

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

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ALTAMONTE SPRINGS, FL 32701
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CIVIL ENGINEERING • TRANSPORTATION • ENVIRONMENTAL • PLANNING • UTILITY ENGINEERING/LOCATING
CERTIFICATE OF AUTHORIZATION License No. 3843
JERALDO COMELLAS, JR. P.E. NO. 45838

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
400	SEMINOLE	407573-1-52-01

UTILITY ADJUSTMENT SHEET (30)

SHEET NO. 567

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